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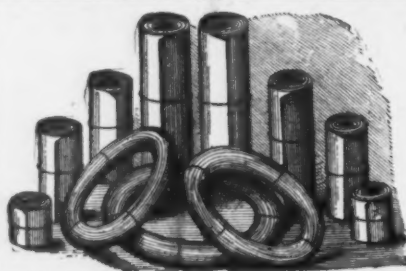
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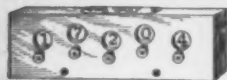
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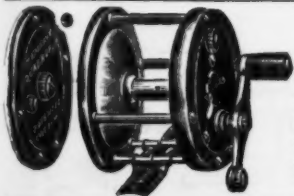
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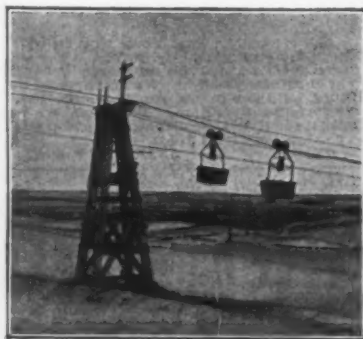
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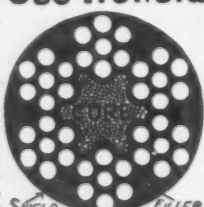


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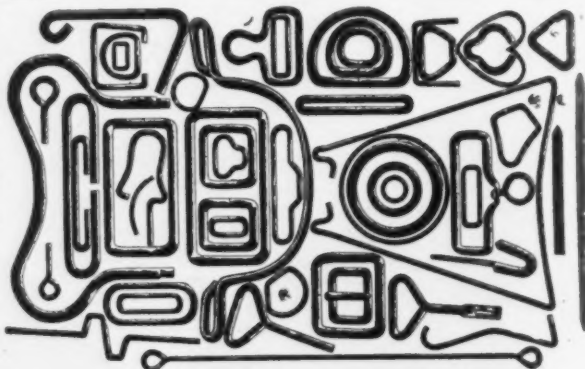
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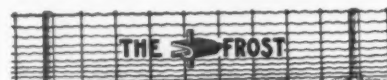
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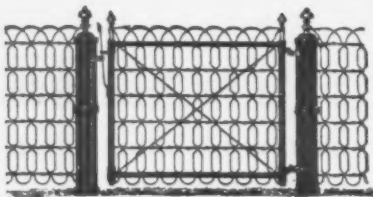
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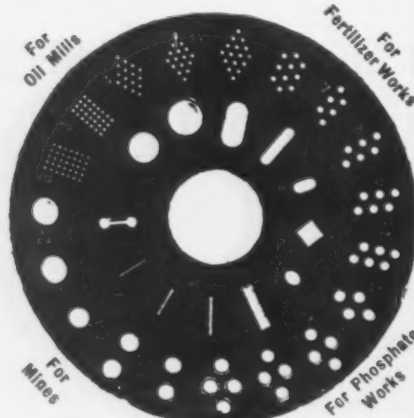
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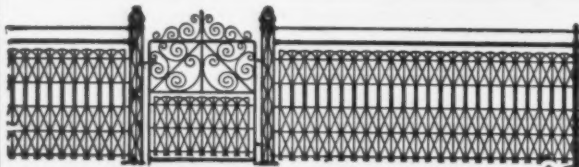
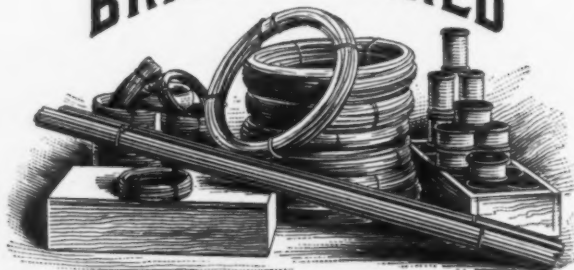
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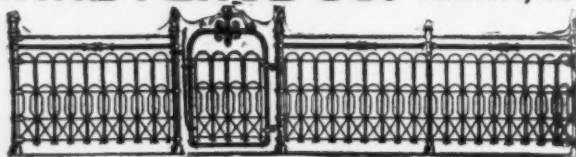
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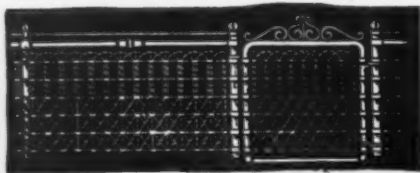
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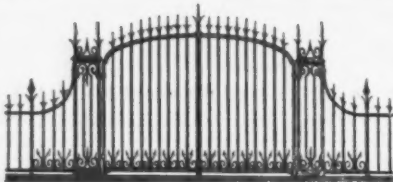
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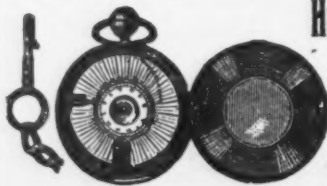
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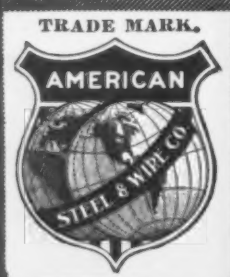
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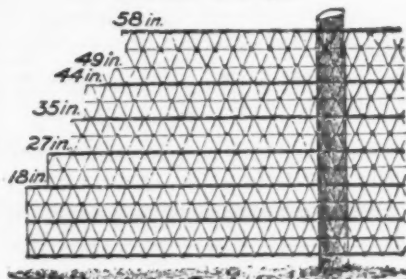
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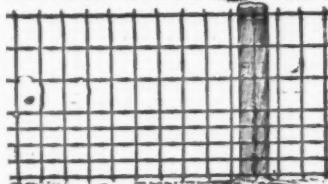
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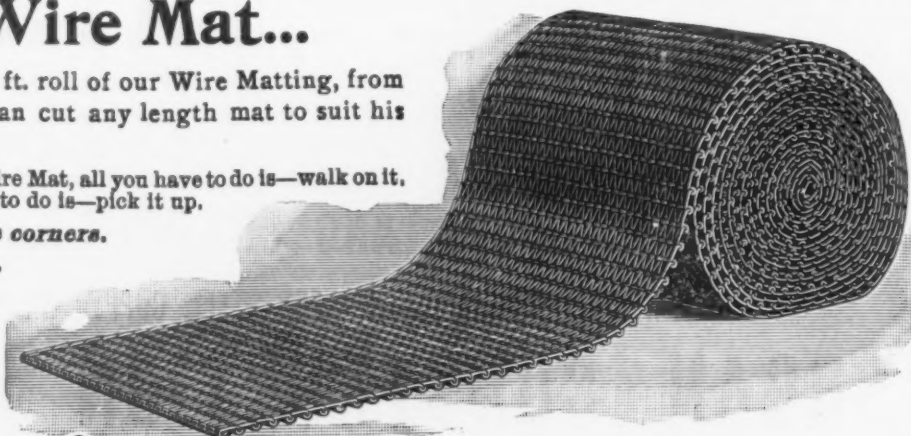
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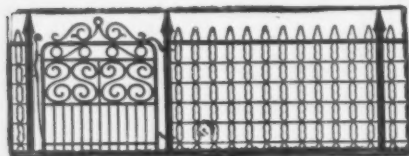
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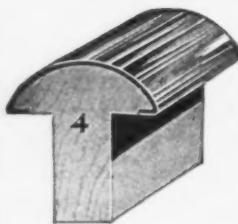
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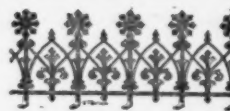
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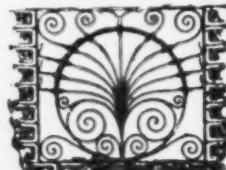
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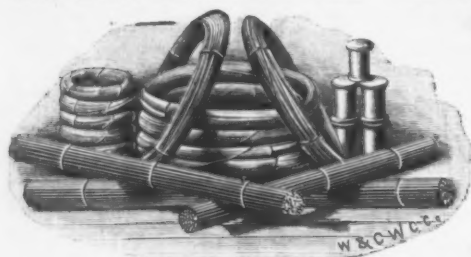
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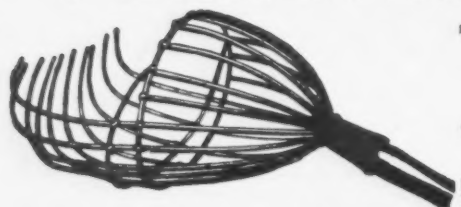
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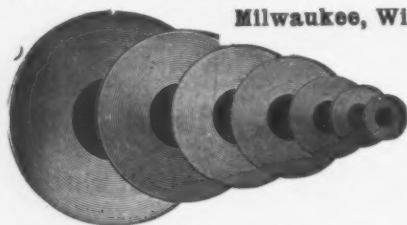
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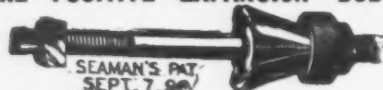
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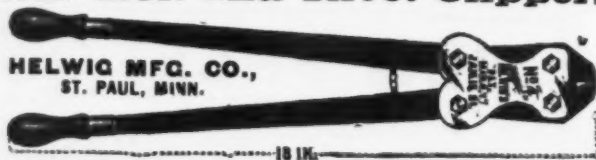
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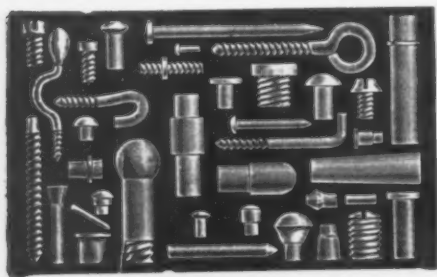
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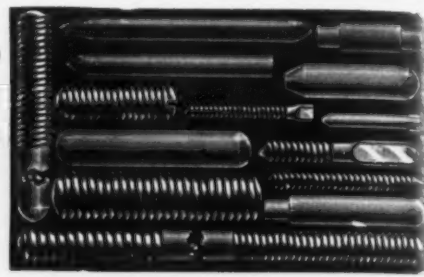
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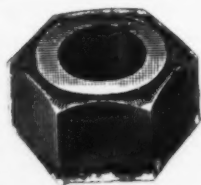
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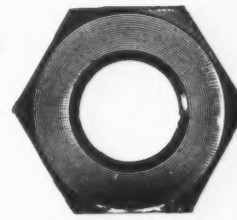
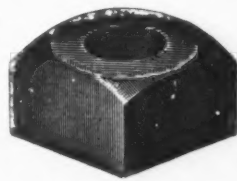
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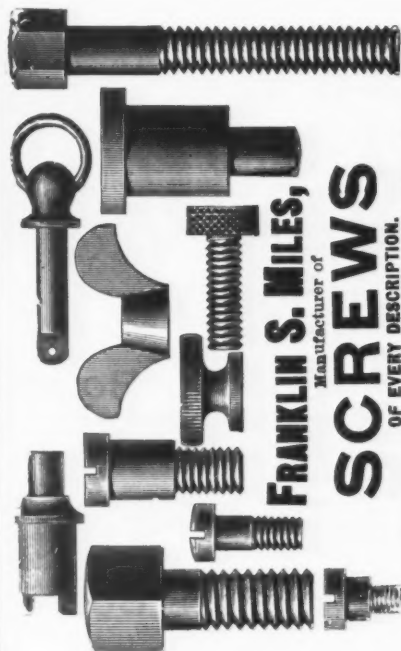


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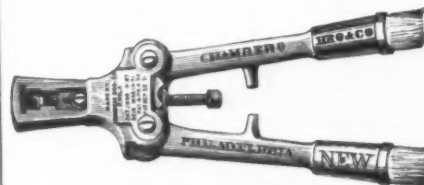
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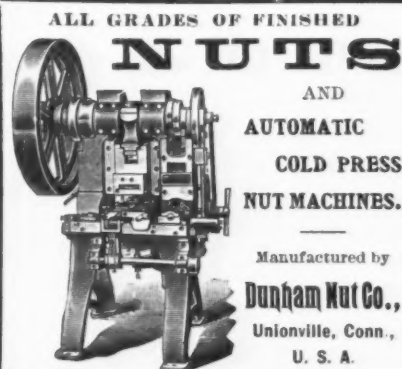


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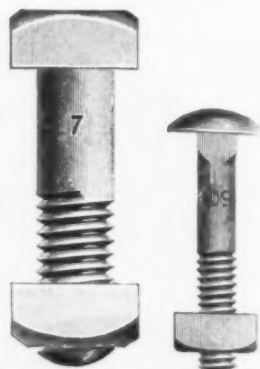
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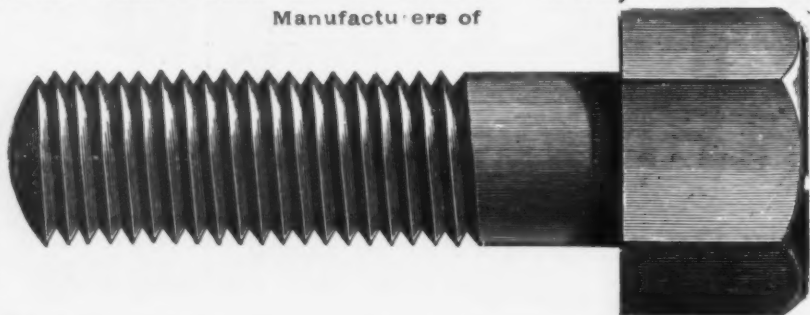


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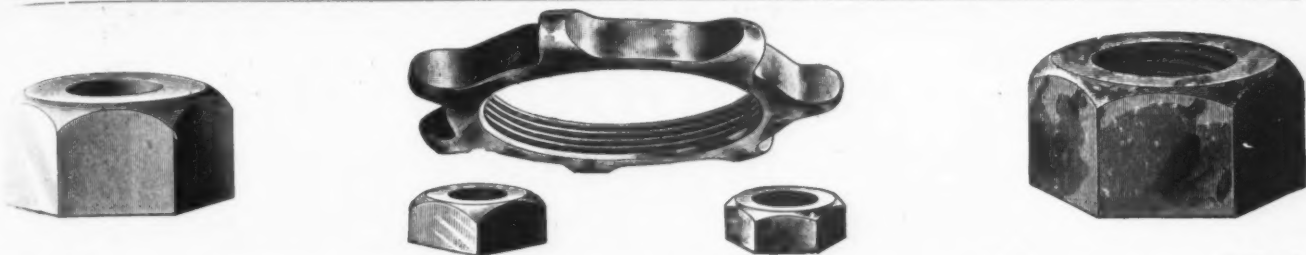
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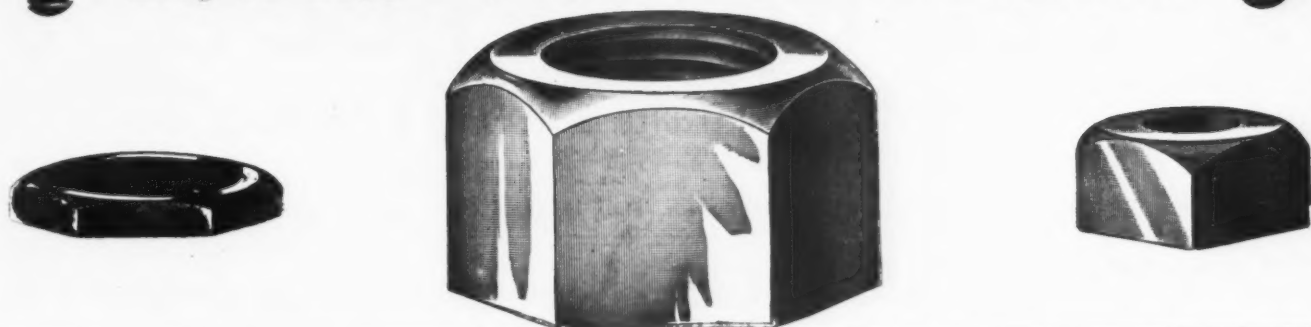
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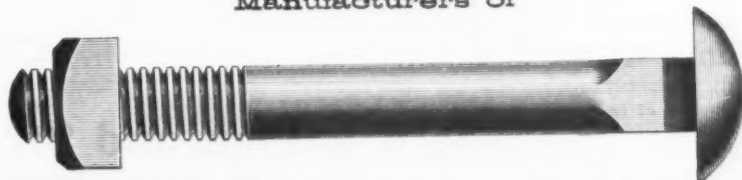
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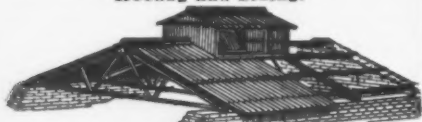
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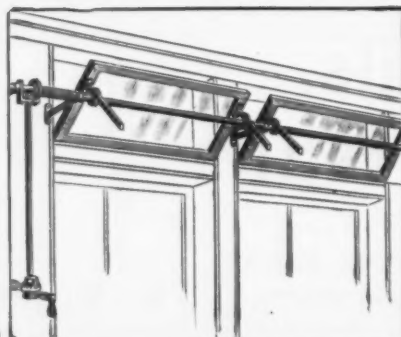
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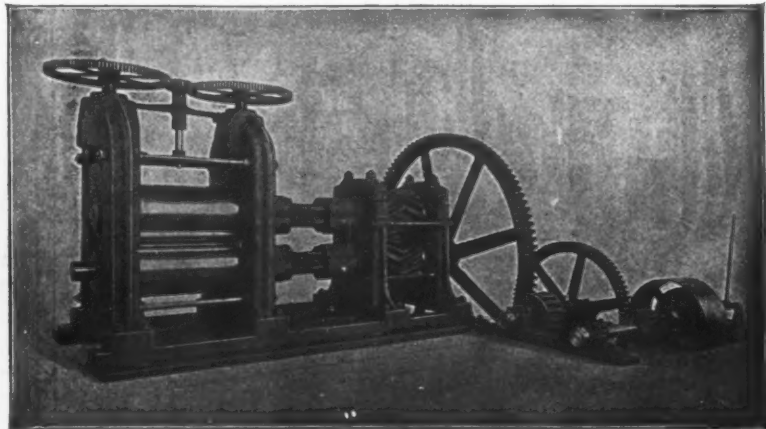
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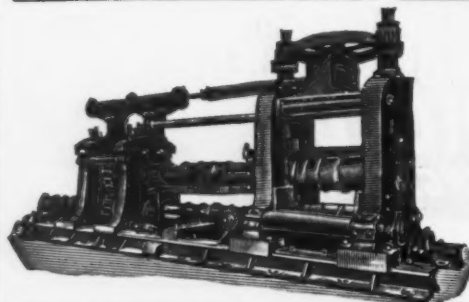
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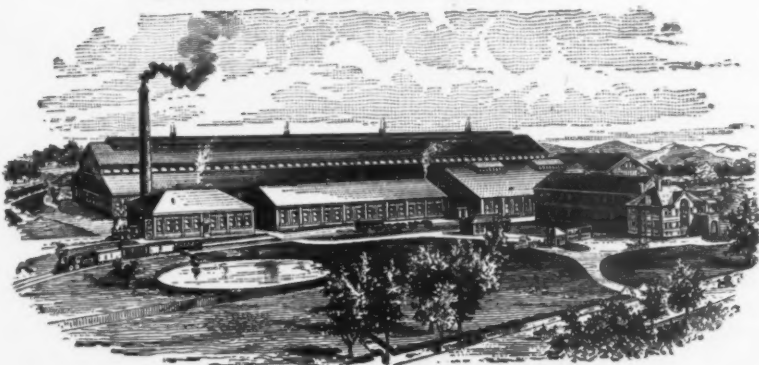
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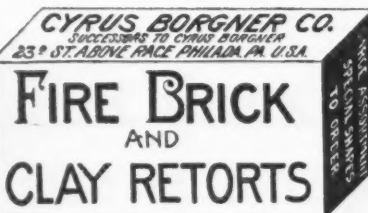
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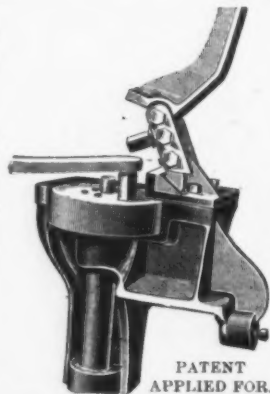
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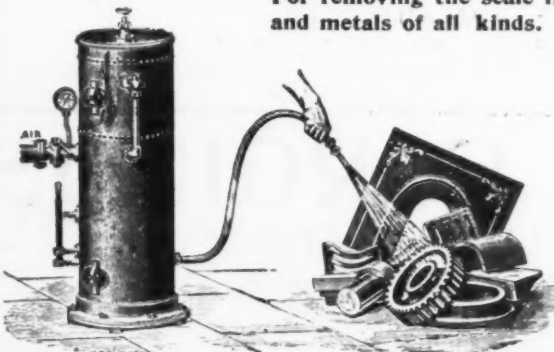
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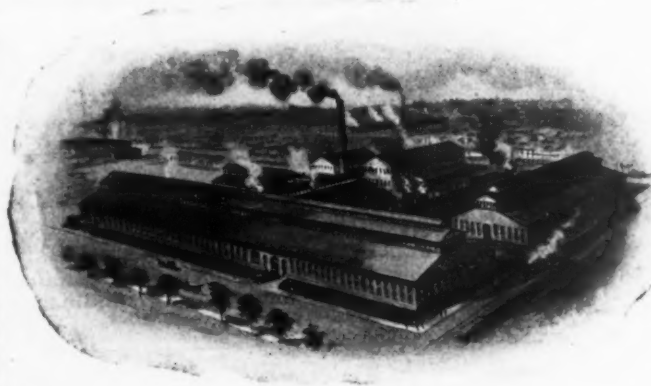
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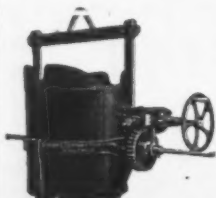
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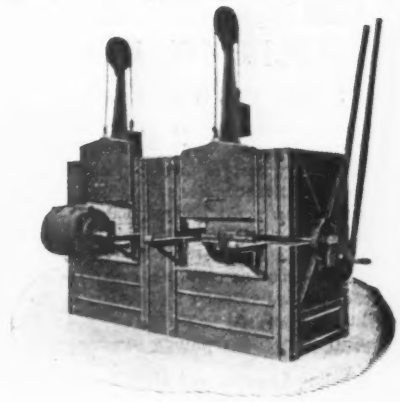
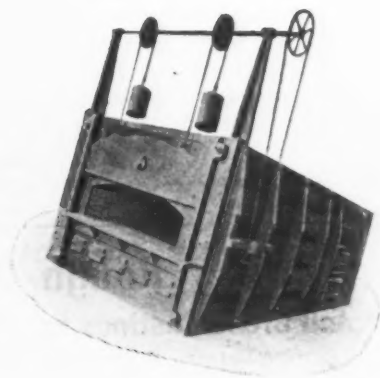
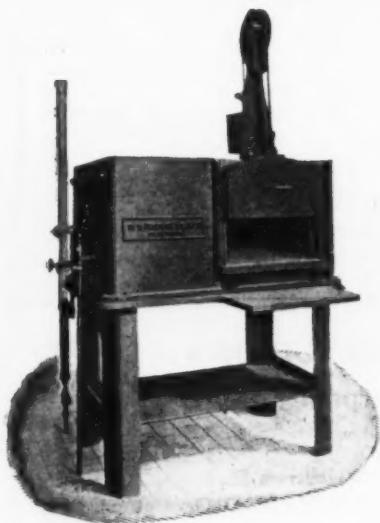
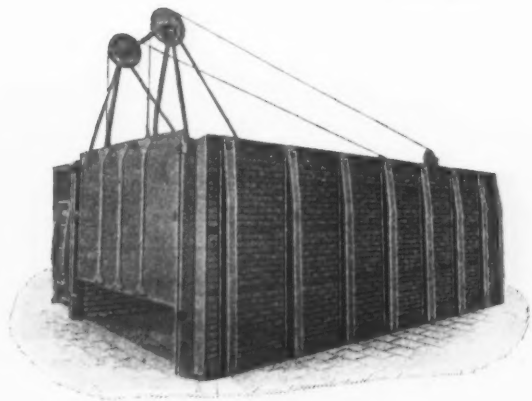
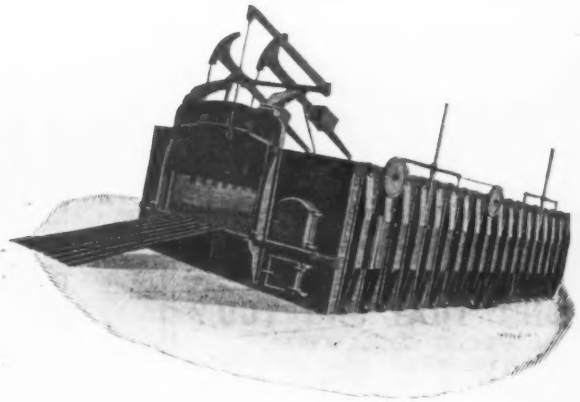
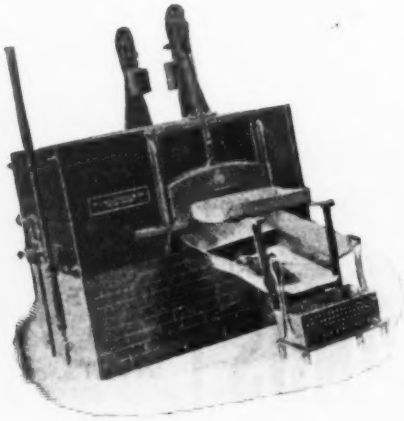
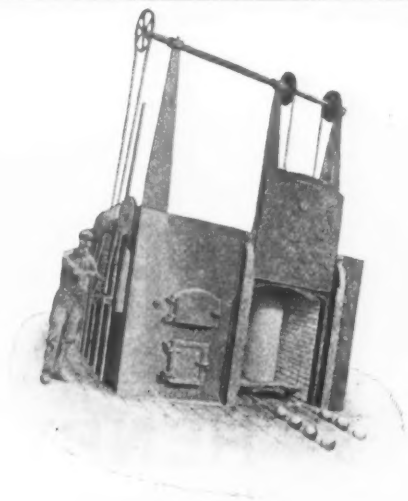
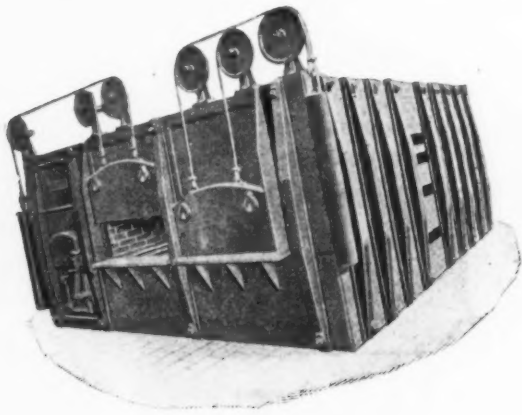


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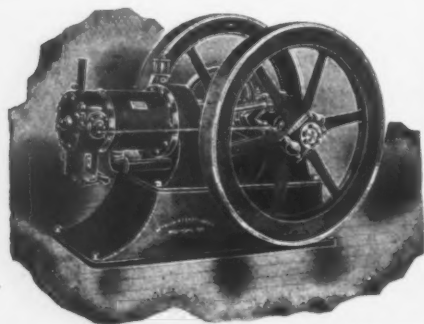
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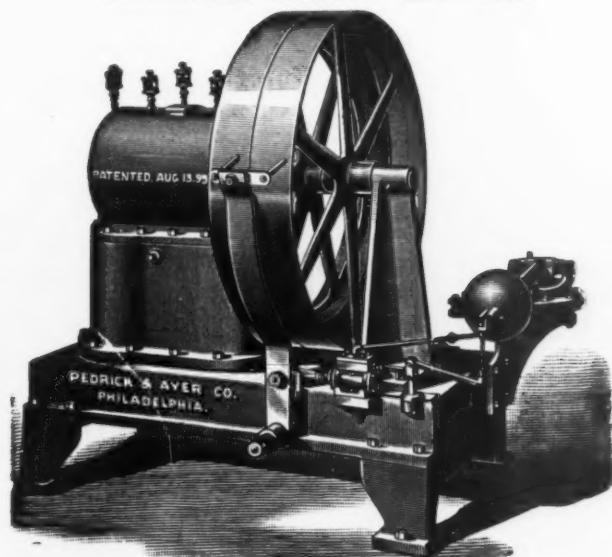
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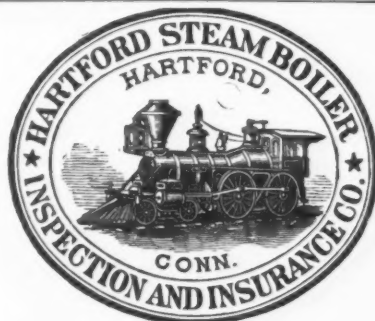
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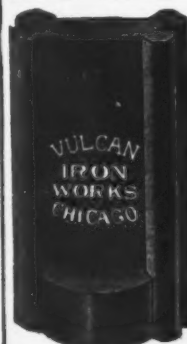
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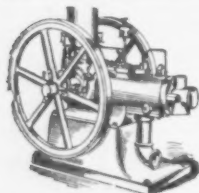
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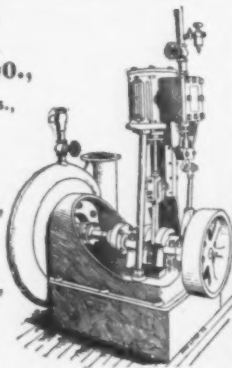
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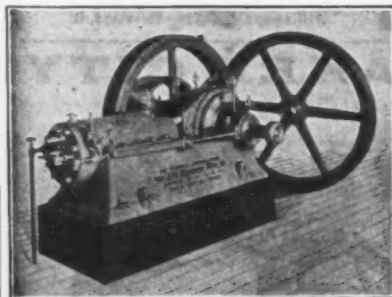
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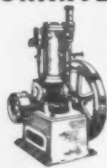
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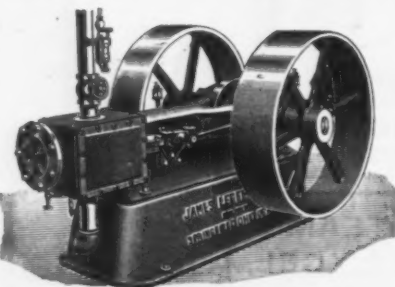
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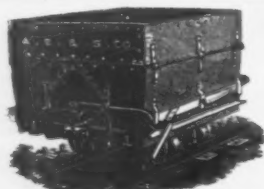
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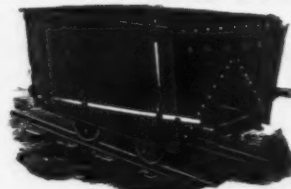


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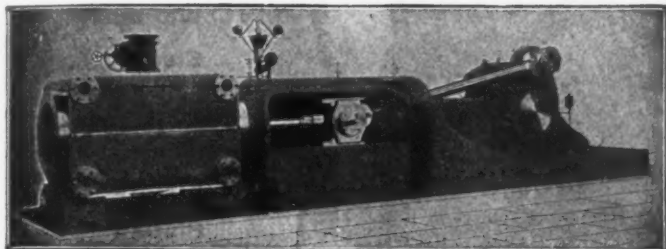


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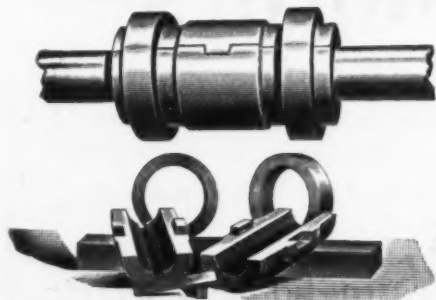
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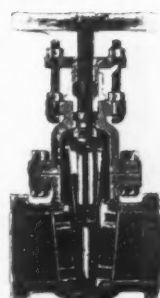
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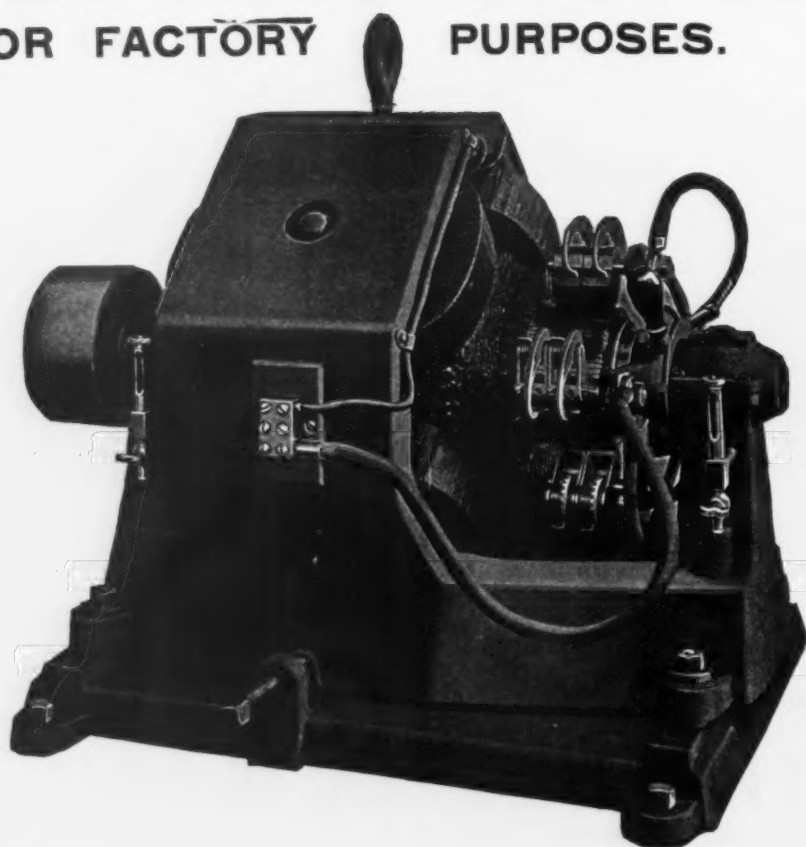


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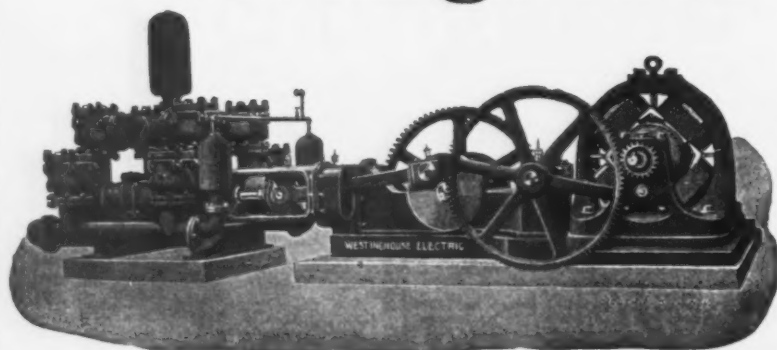
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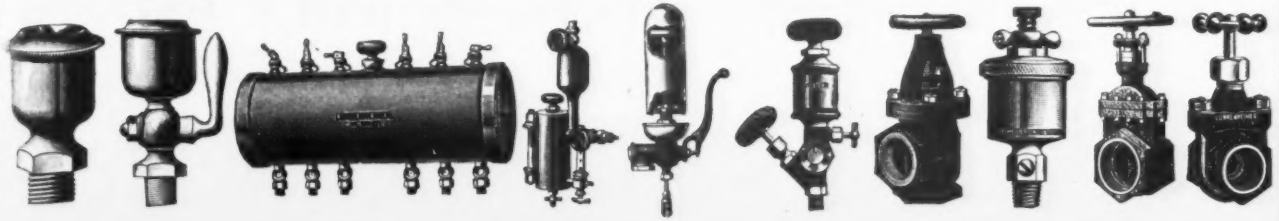


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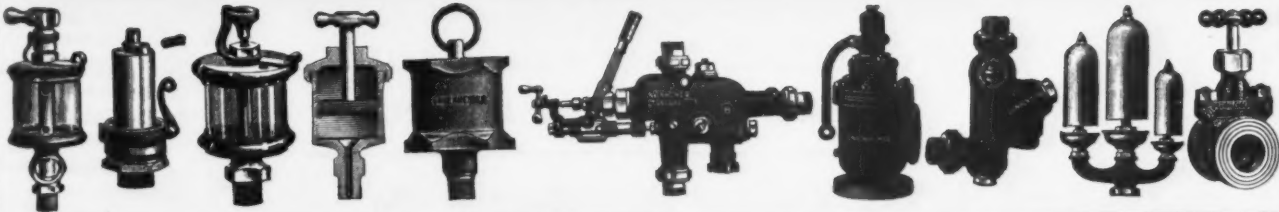
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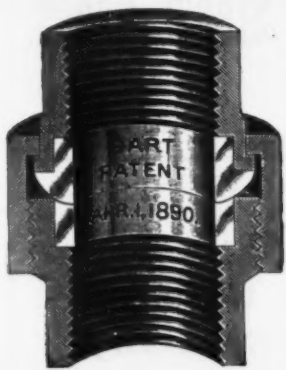
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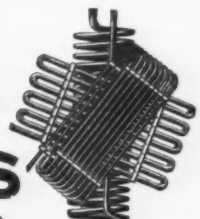
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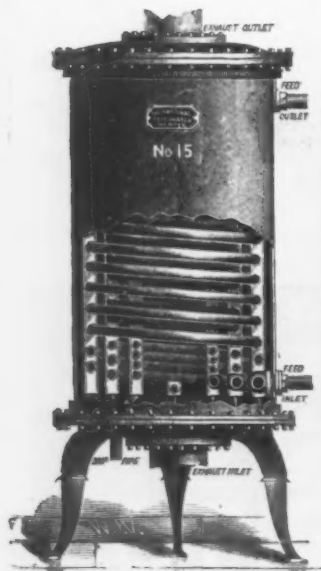
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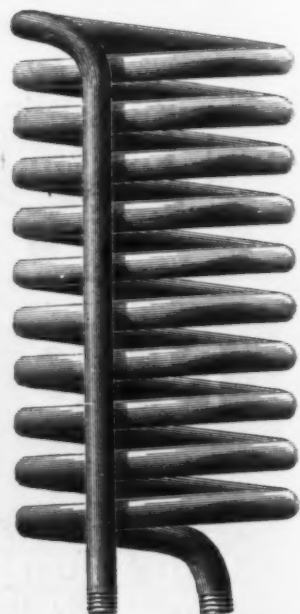


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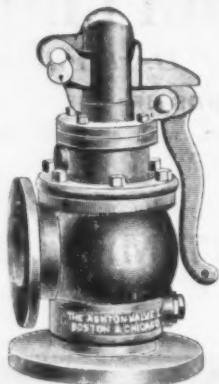
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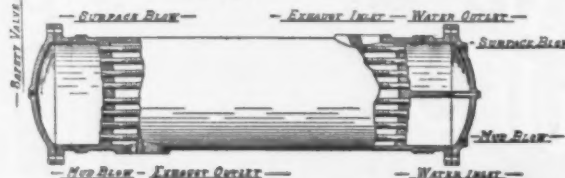
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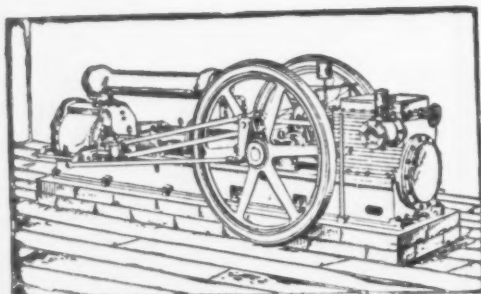
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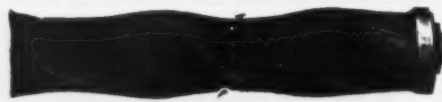
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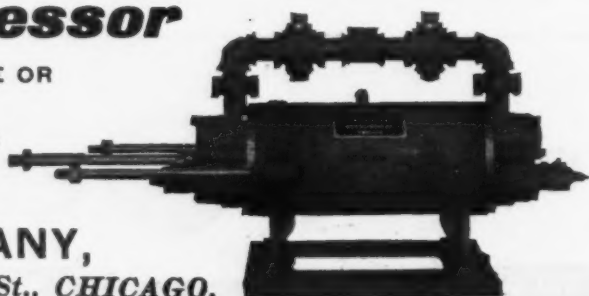
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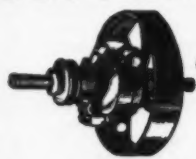
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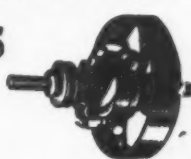
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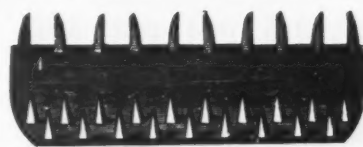
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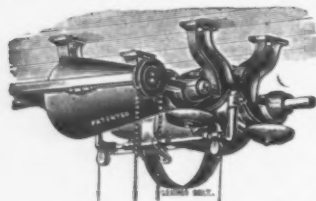
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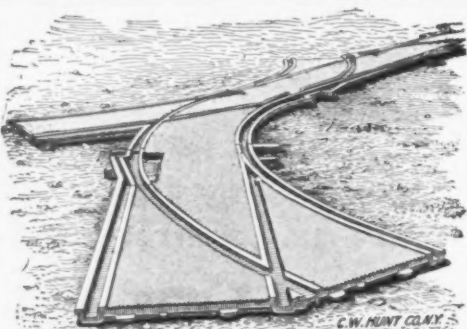
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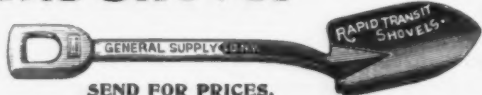
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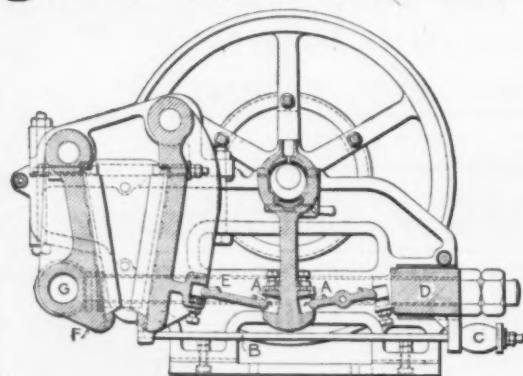


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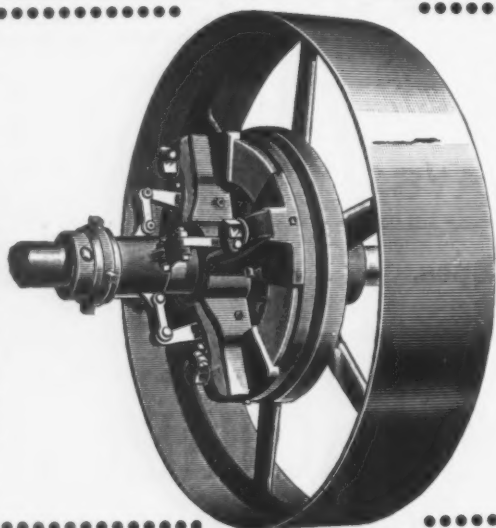
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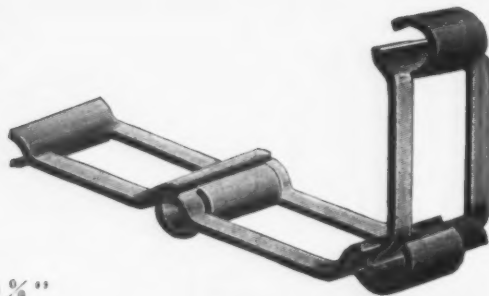
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Things in the steel foundry got to booming and they enlarged again, bigger than ever.—

They came and got some more RIDGWAY CRANES.

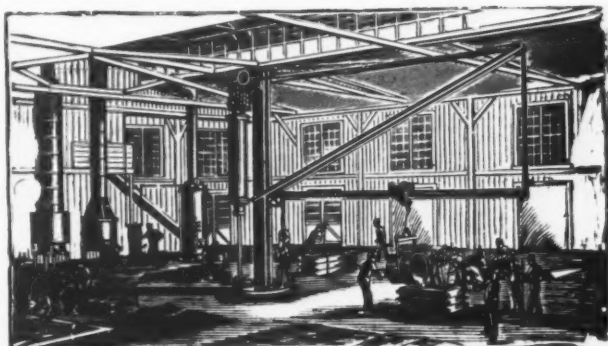
There have been no cases of starvation in the steel foundry business this year and here they are enlarging again with the biggest steel foundry in the land.

And we are making them some more RIDGWAY CRANES.

We might write here for a month and say nothing better for the Ridgway Crane than the above simple narrative. We asked Mr. Atha, being naturally a little curious, why he got so many Ridgway Cranes.

"Simply because they are the greatest foundry appliance we have ever seen and are such wonderful helps to the molders in getting up work," said he. "Traveling cranes are all right in their places and we have them also; but for the actual work of the foundry the Ridgway Crane is beyond comparison."

But you don't believe a word of it, do you? Simply advertising gush! Never mind, you'll take a hint some day.



5-Ton Steam Hydraulic Crane in a Foundry.

OIL-GOVERNED AIR HOISTS.

The best concerns all over the land get these hoists.

If you come here we'll show you who, if you want to know.

If you will hang one up and work it you will never get any other sort.

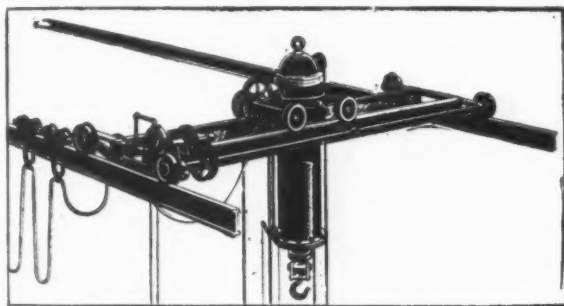
We are making them of any capacity now because they are so safe.

A little higher in price—not much—but, oh, so good.

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JOHN BULL IS NOW GETTING ON TO IT.

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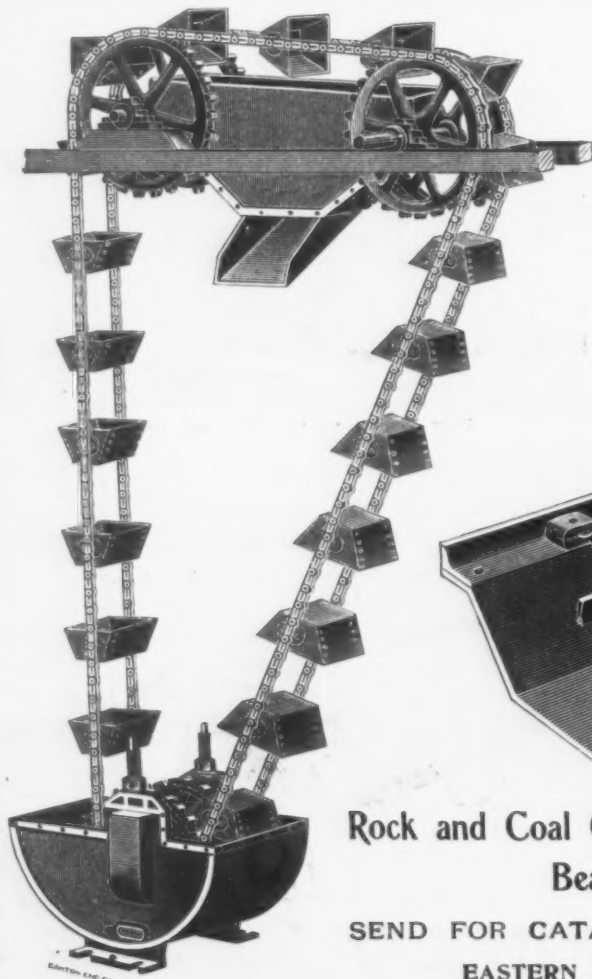
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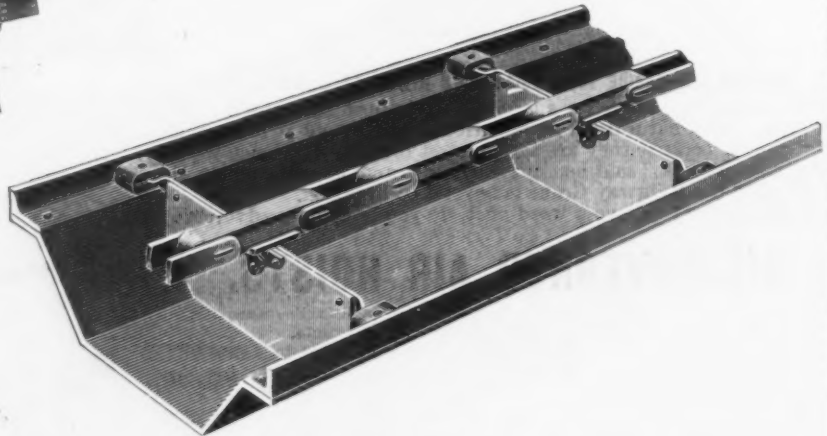
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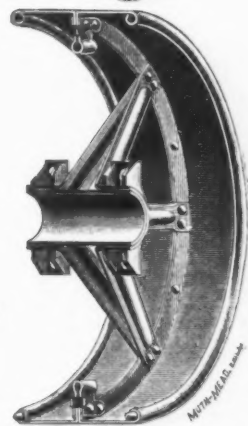
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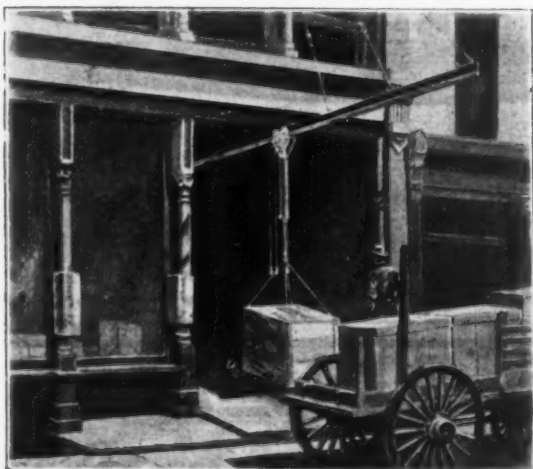
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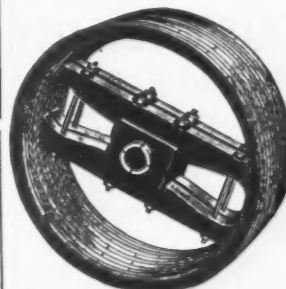


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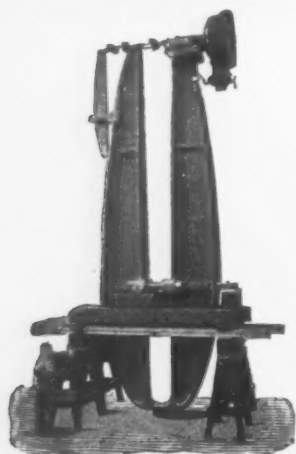
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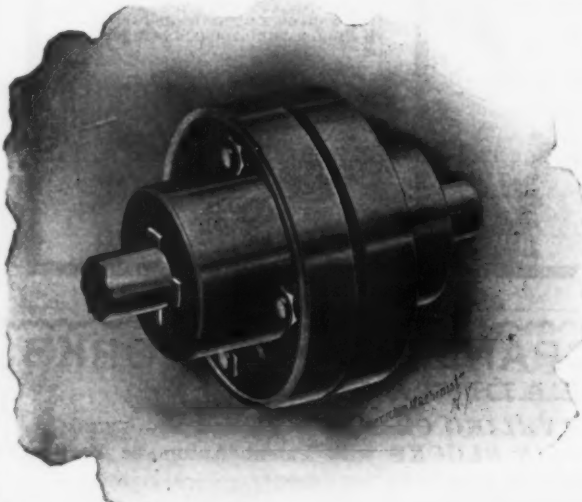
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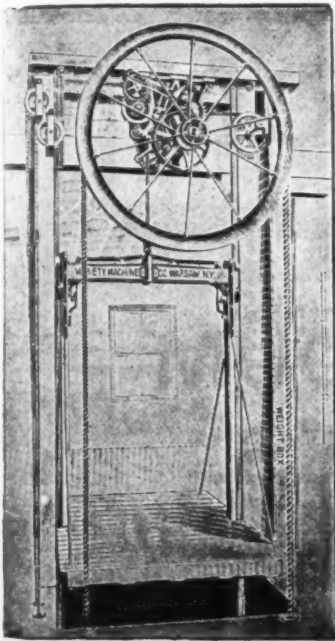
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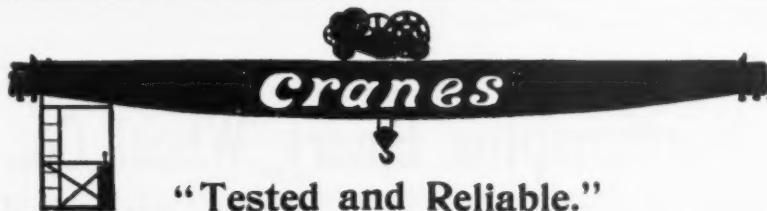
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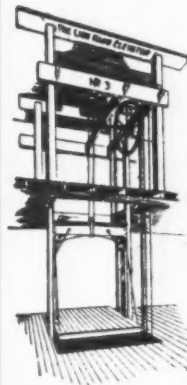
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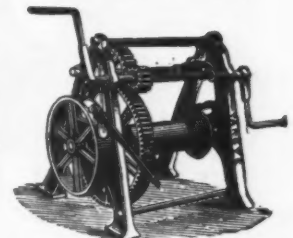
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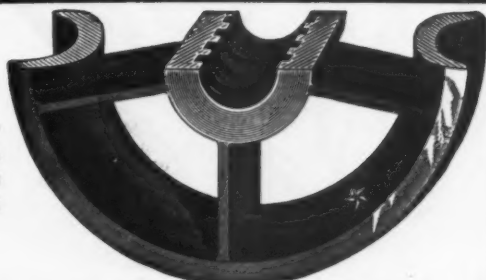
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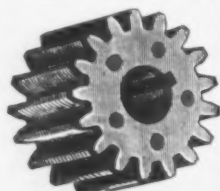
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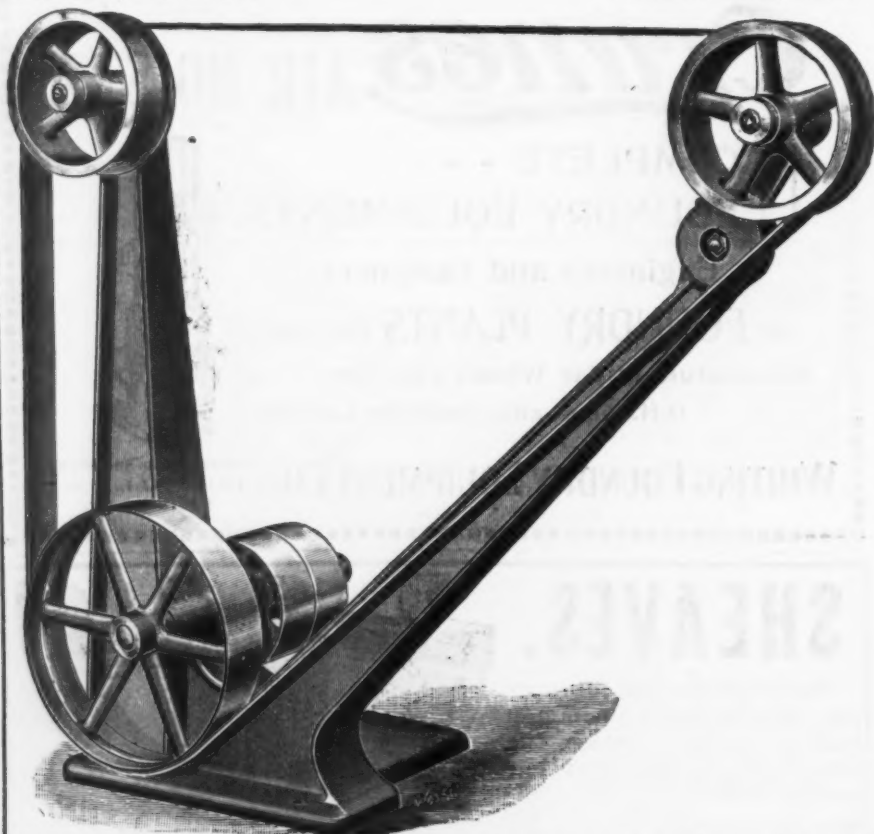
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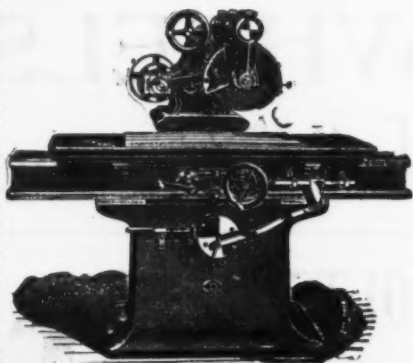
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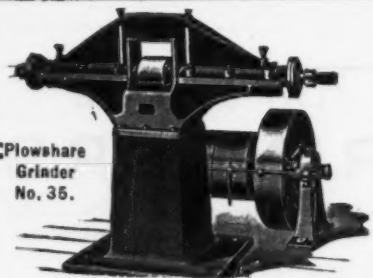
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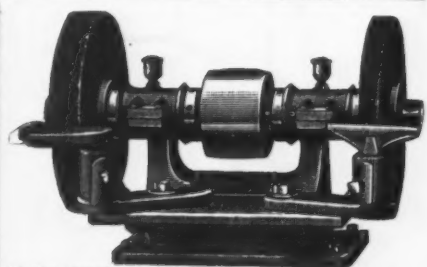
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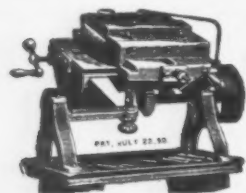
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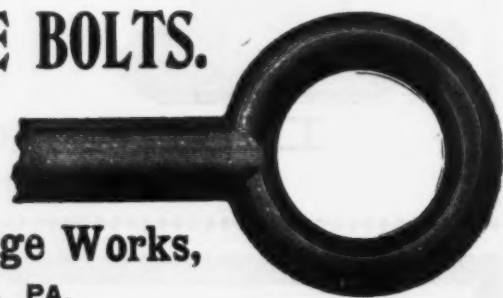
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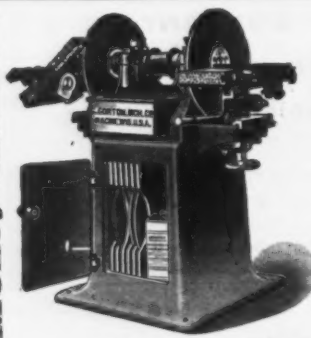
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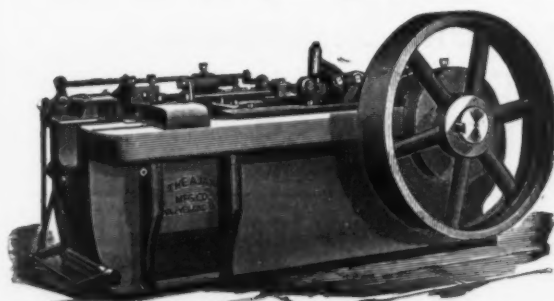
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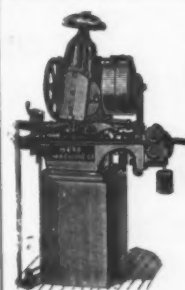
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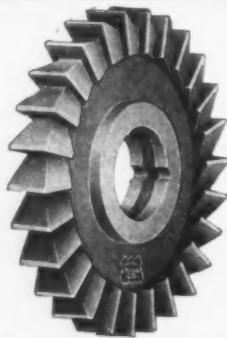
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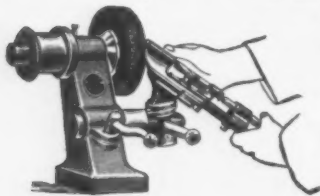
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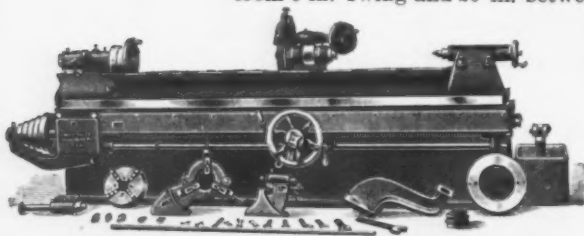
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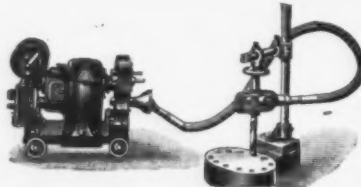
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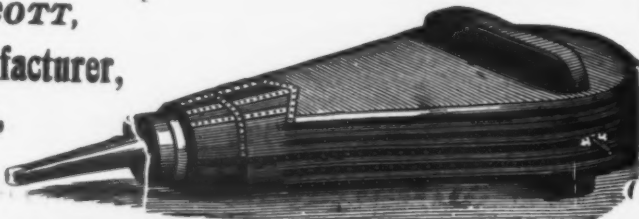
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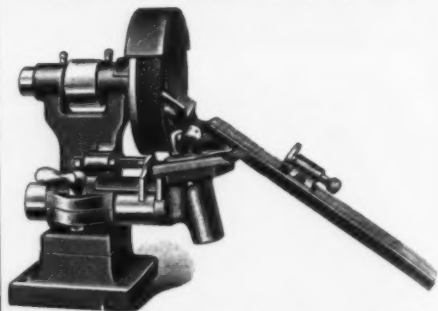
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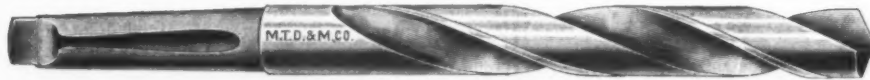
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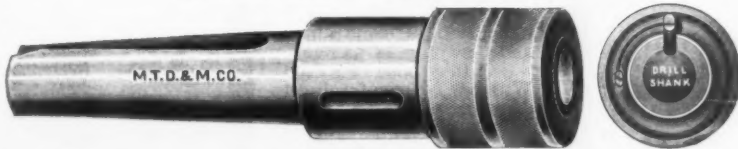
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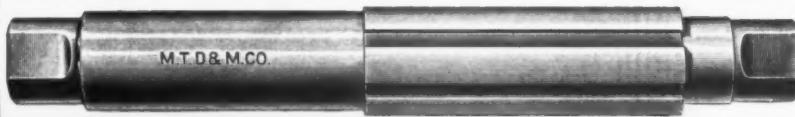
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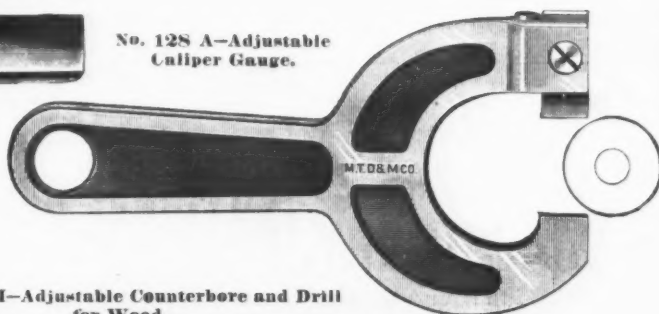
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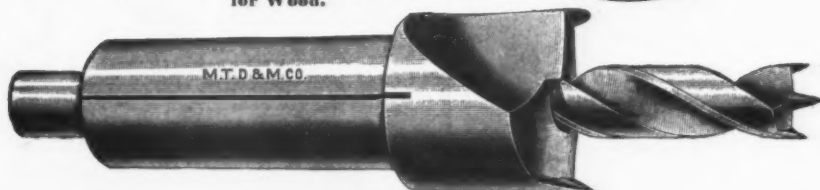
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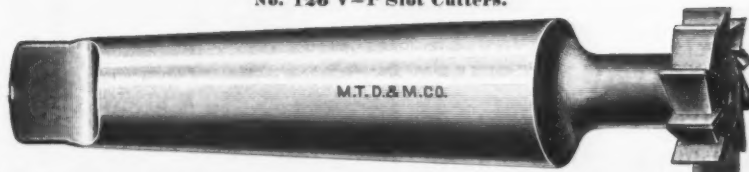
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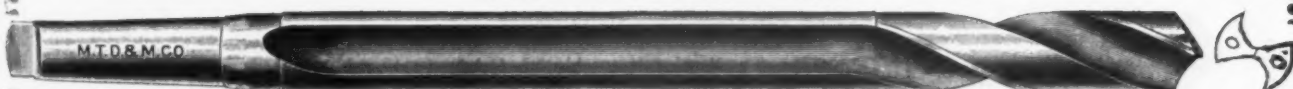
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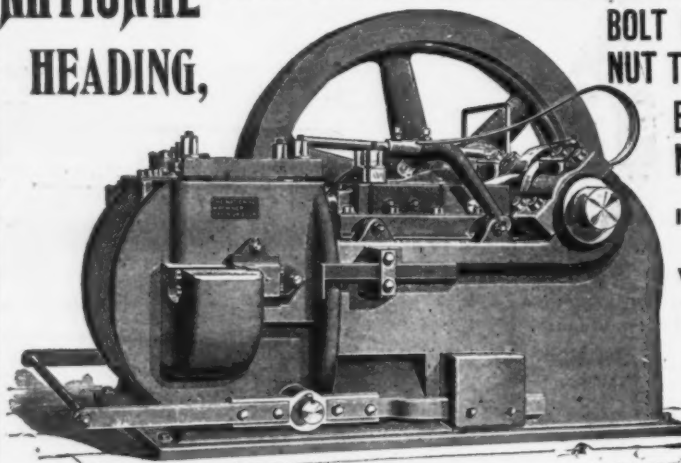
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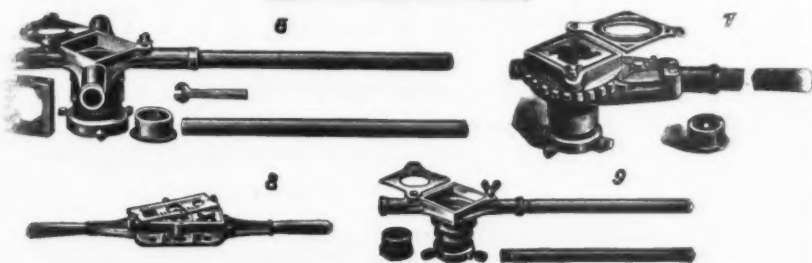
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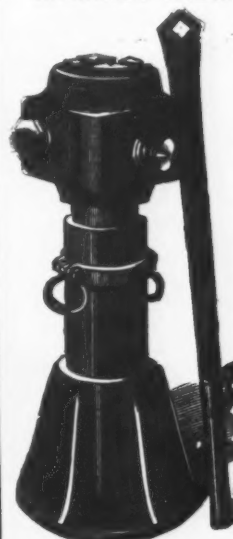
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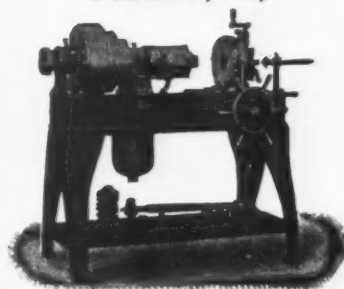
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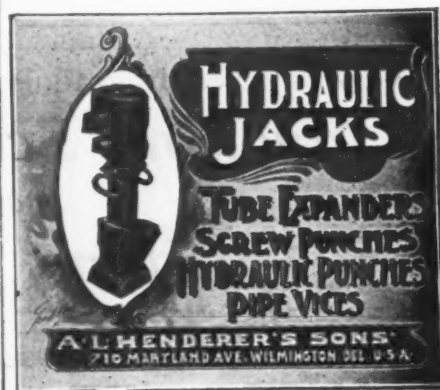
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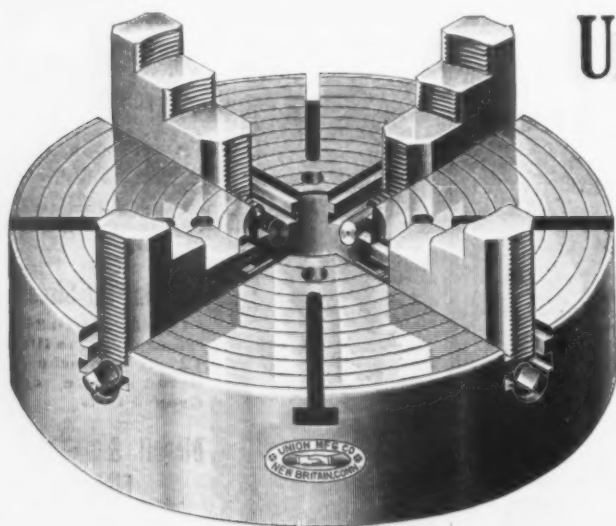
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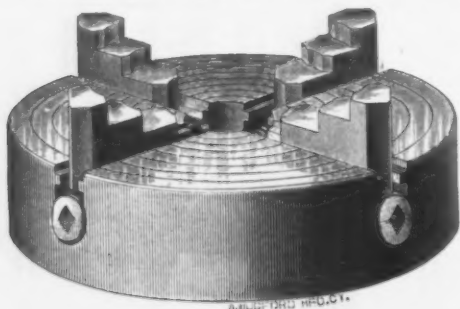
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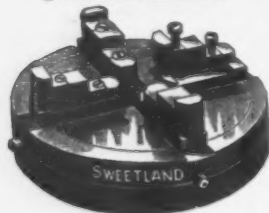
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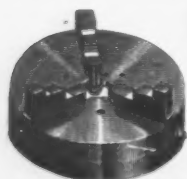


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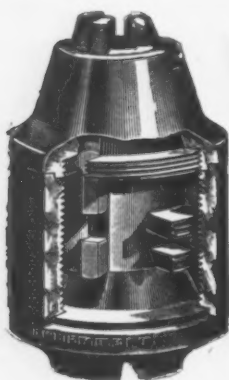
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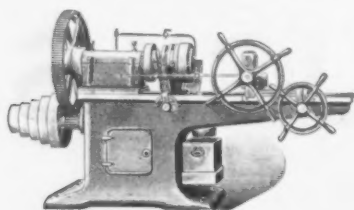
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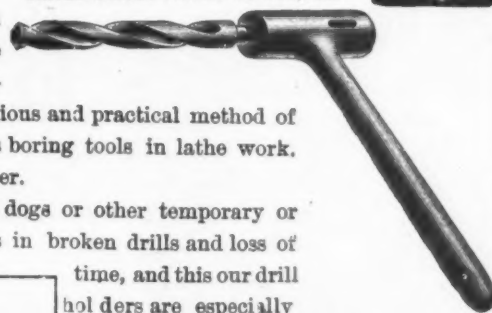
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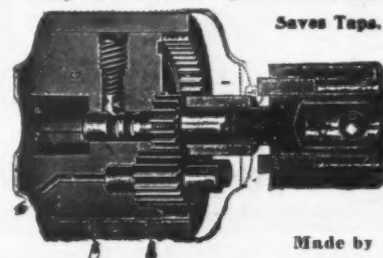
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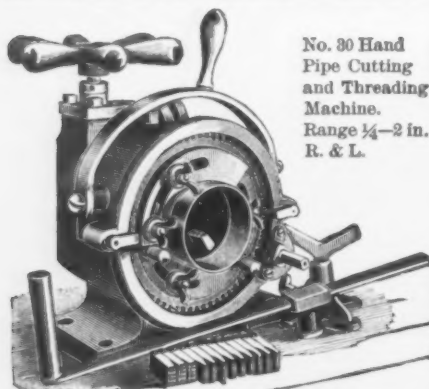
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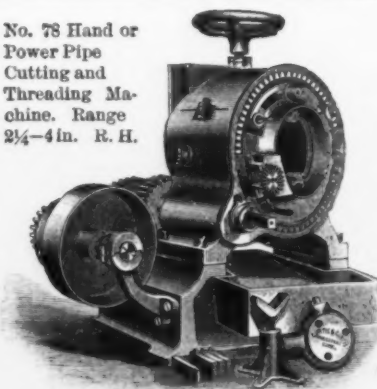
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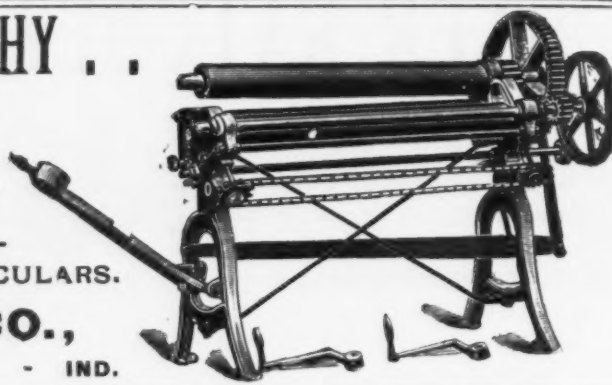
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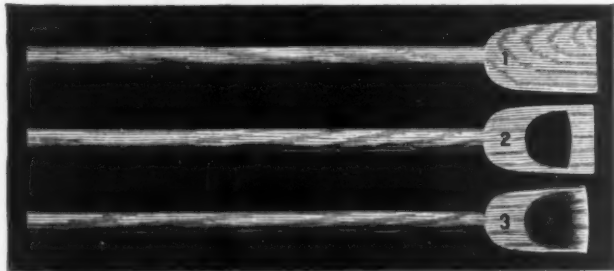
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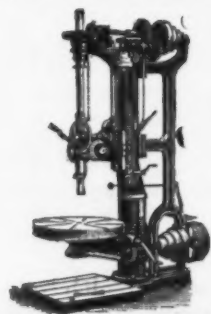
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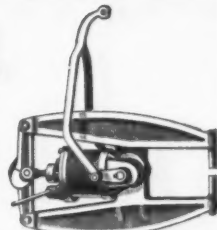
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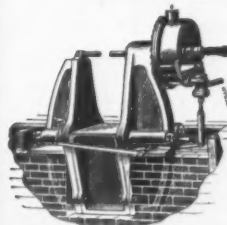
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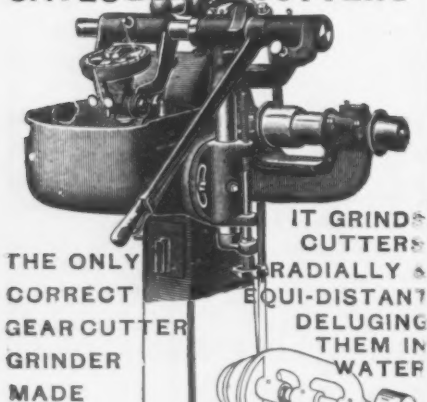
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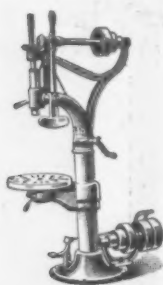
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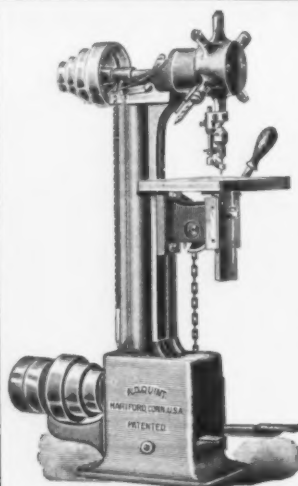
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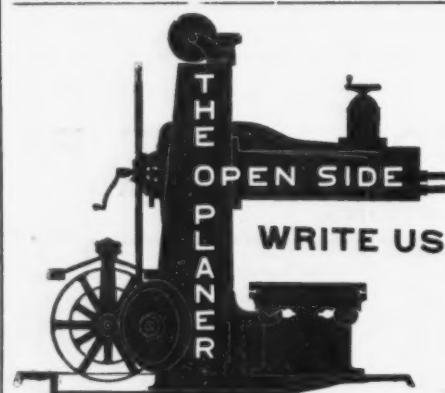
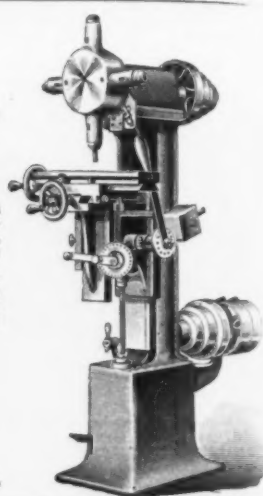
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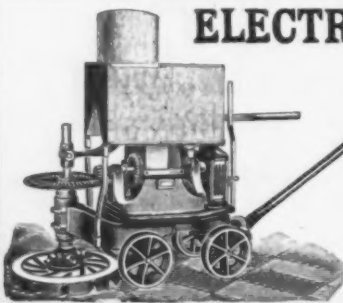
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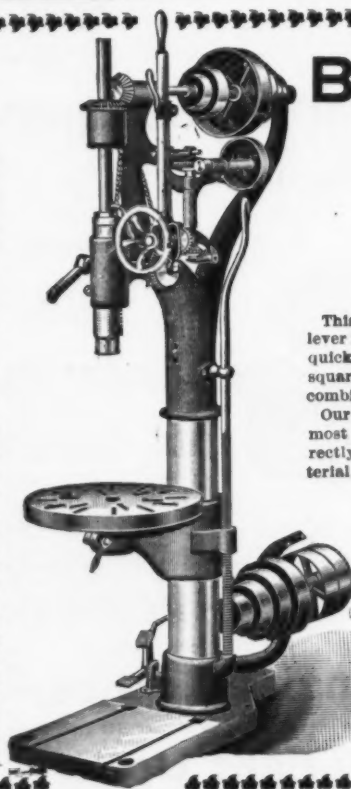
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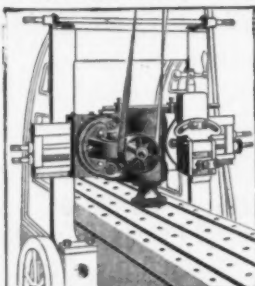
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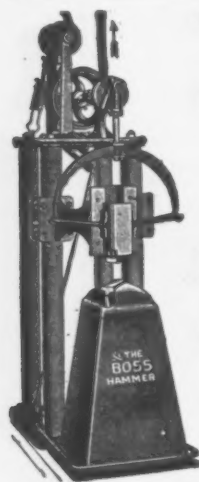
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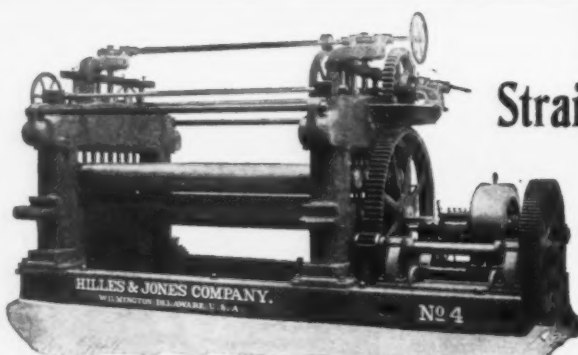
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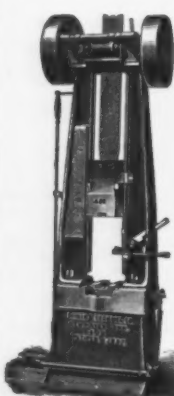


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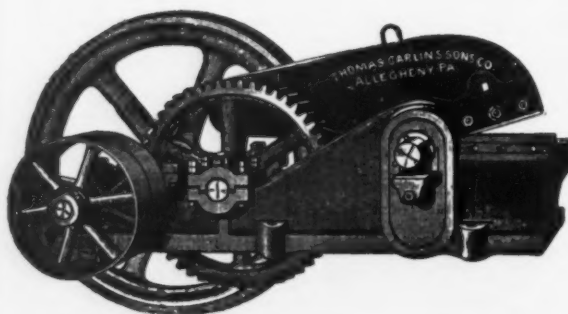
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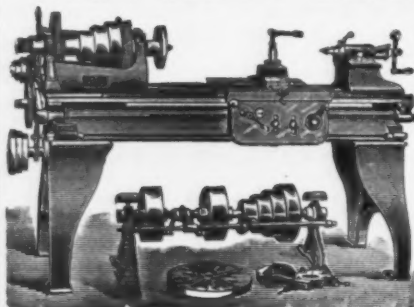
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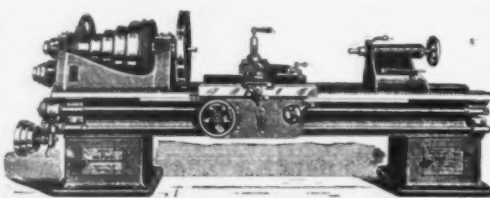
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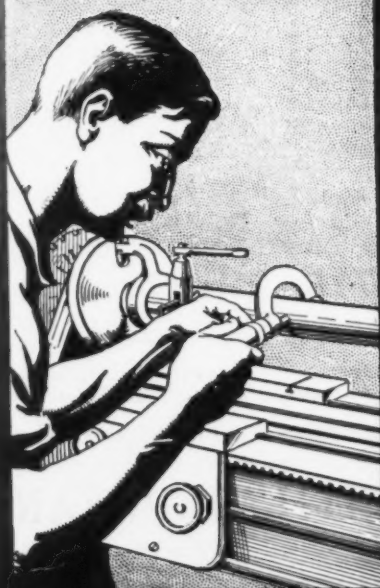
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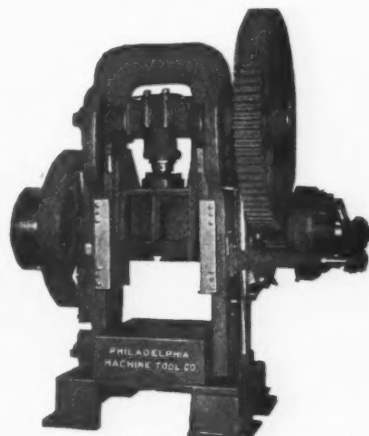


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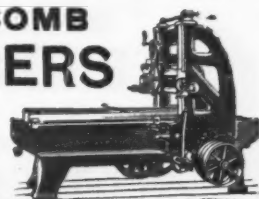
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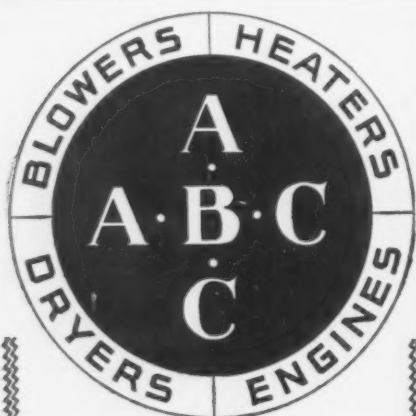
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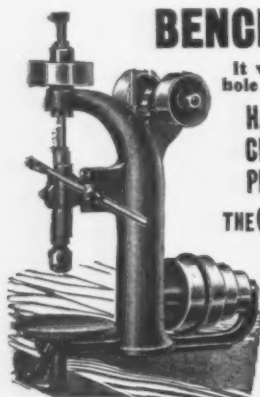
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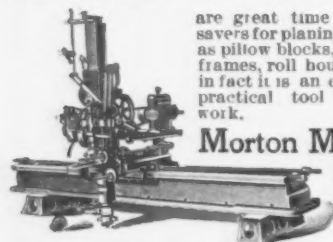
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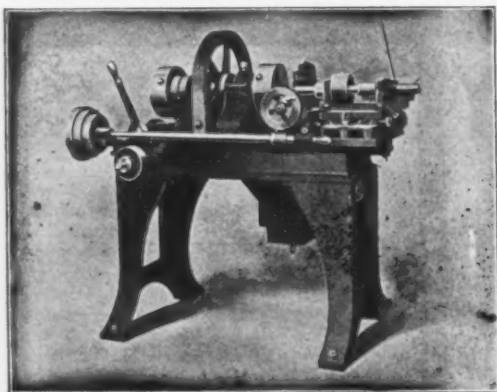
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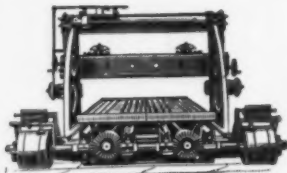
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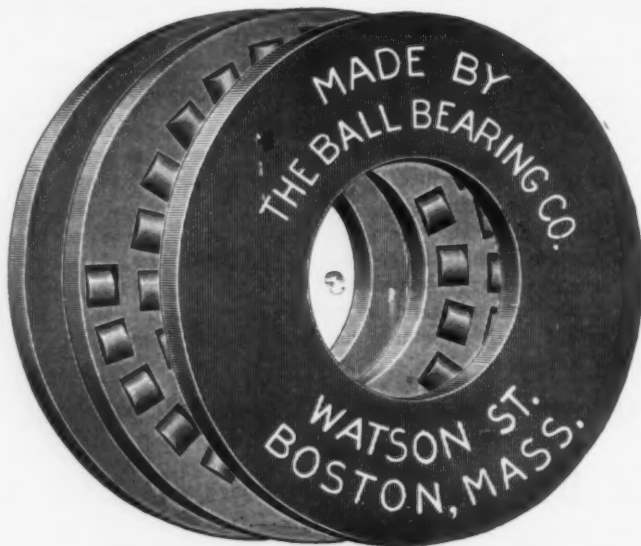
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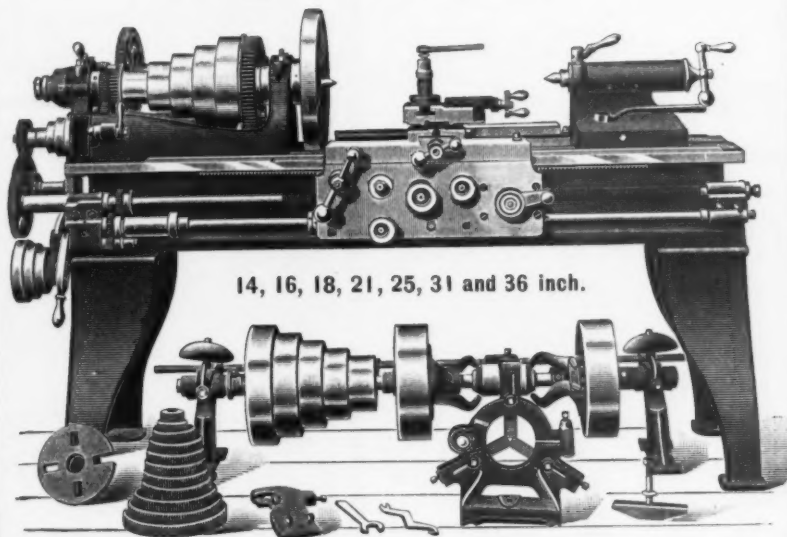
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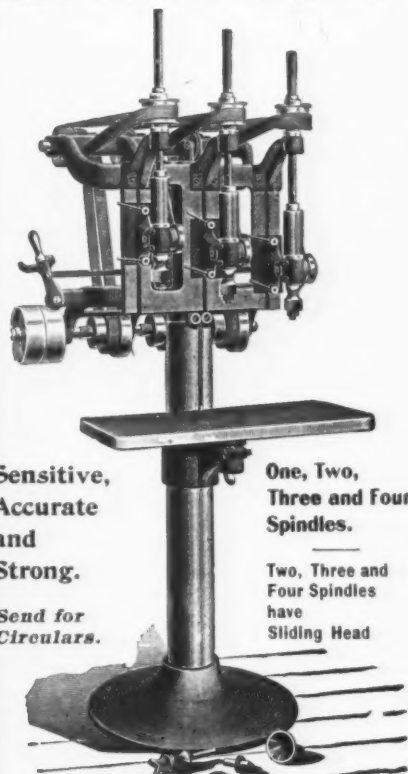
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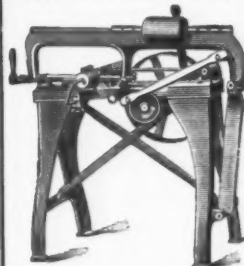
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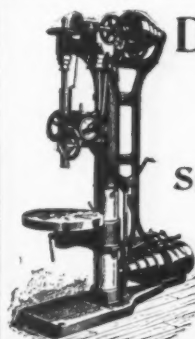


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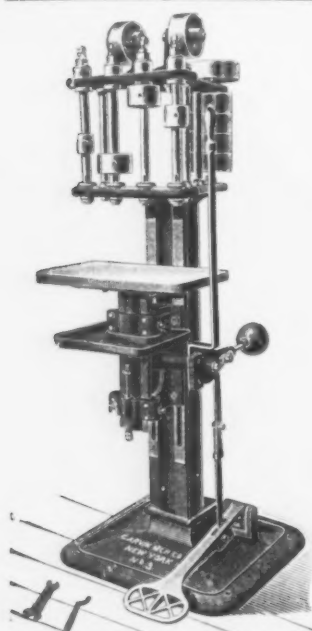
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A series of useful little manuals on various industrial subjects, recently published and called the Work Handbooks, are listed below, in view of their completeness and low price. These books were prepared under the direction of Paul N. Hasluck, editor of the English paper, *Work*: "Cycle Building and Repairing;" "Dynamos and Electric Motors: How to Make and Run Them;" "Smith's Work;" "Wood Finishing—Comprising Staining, Varnishing, Polishing, &c.;" "Electric

Bells—How to Make and Fit Them;" "How to Write Signs, Tickets and Posters;" "Mounting and Framing Pictures;" "Glass Working;" "Building Model Boats;" "Boot Making and Mending—Including Repairing, Lasting and Finishing;" "Decorative Designs of All Ages for All Purposes;" "House Decoration—Comprising Whitewashing, Paperhanging, Painting, &c.;" Illustrated, cloth. Each.....40 cents

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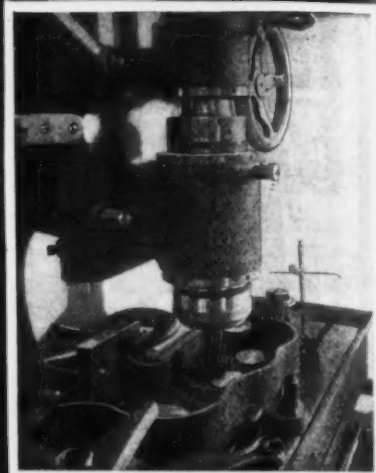
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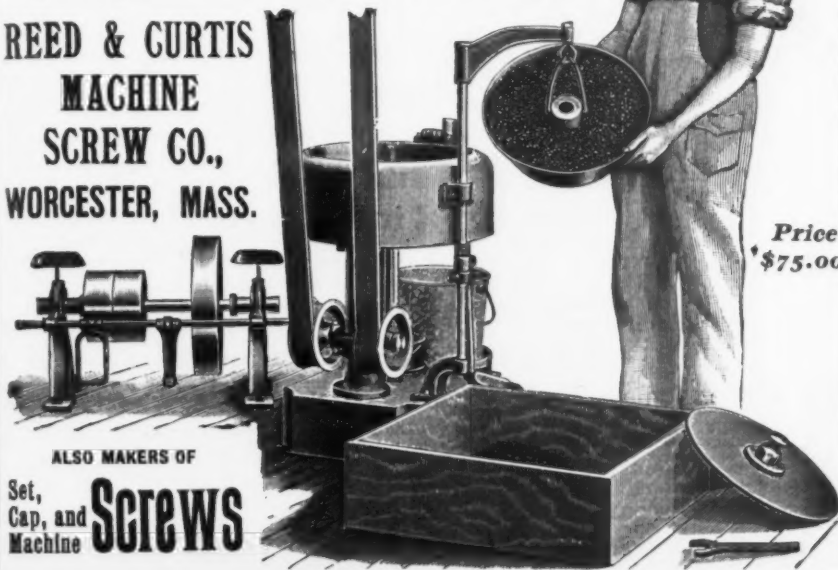
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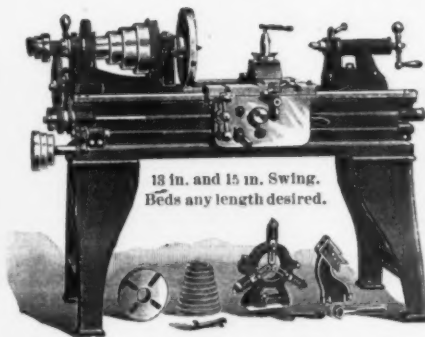
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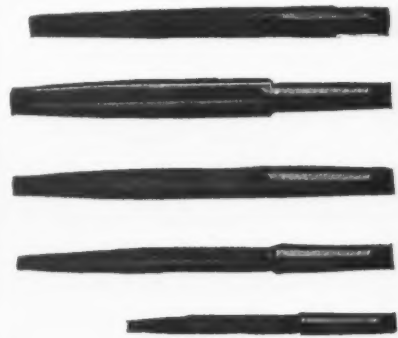
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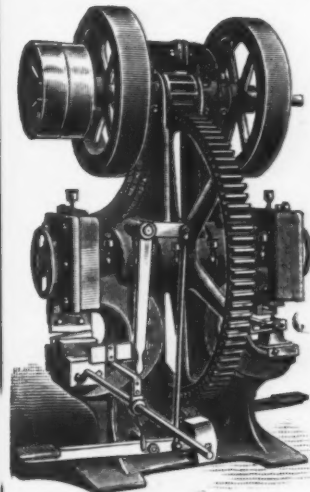
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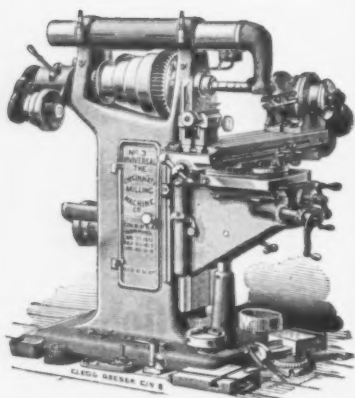
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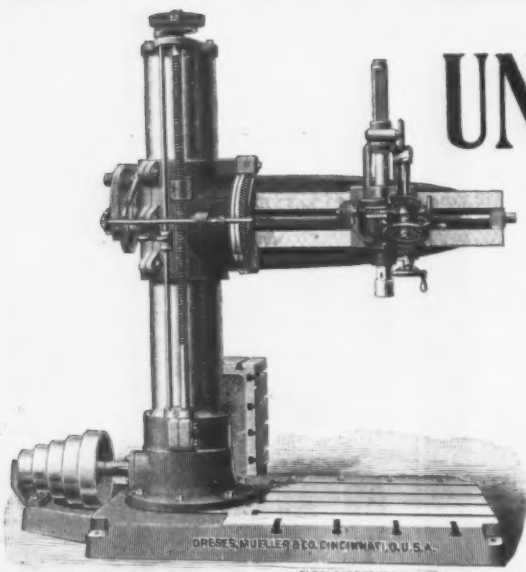
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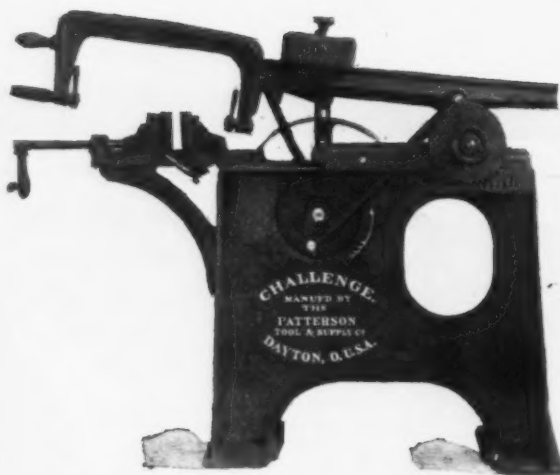
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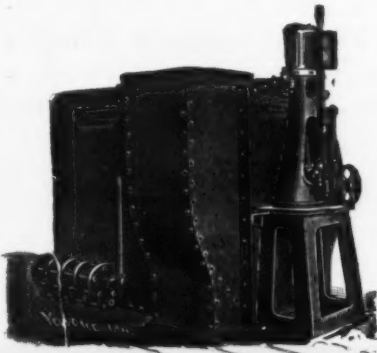
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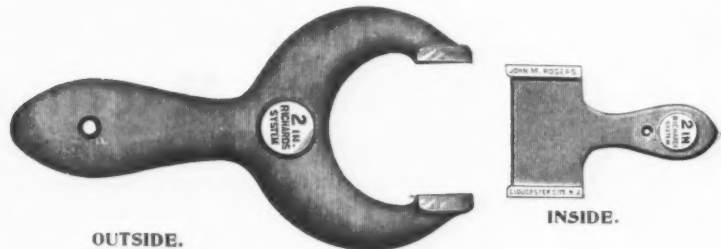
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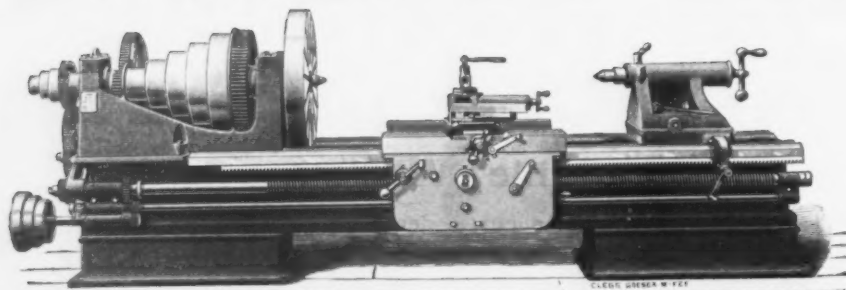
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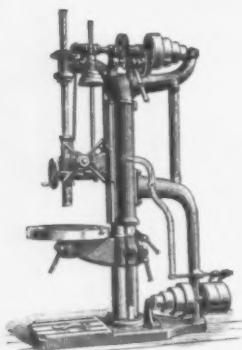
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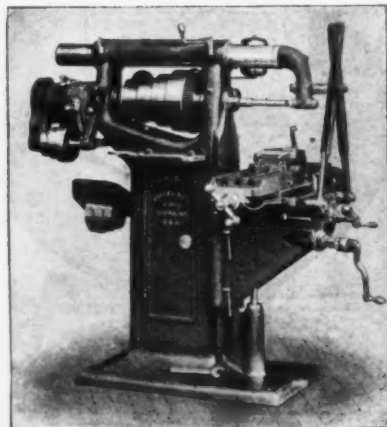
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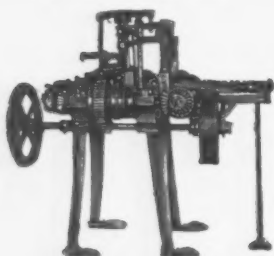
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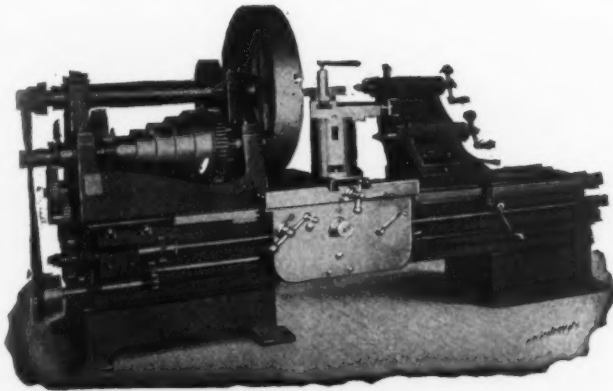


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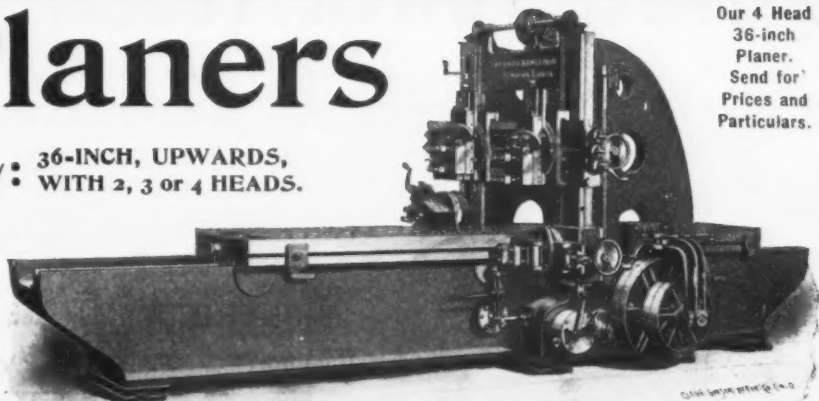
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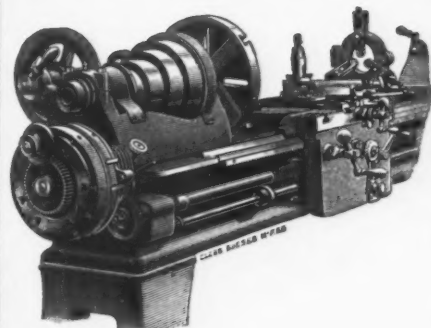
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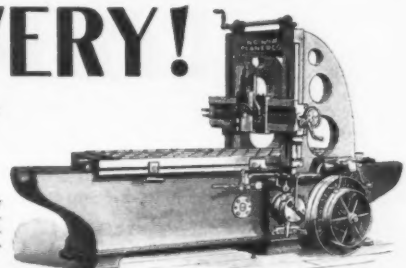
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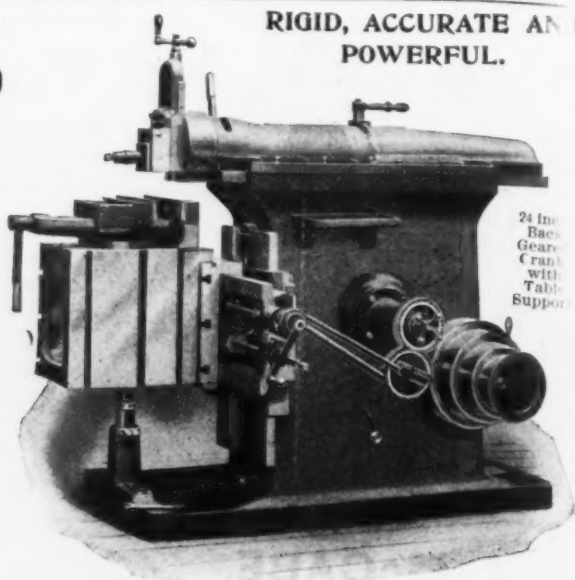
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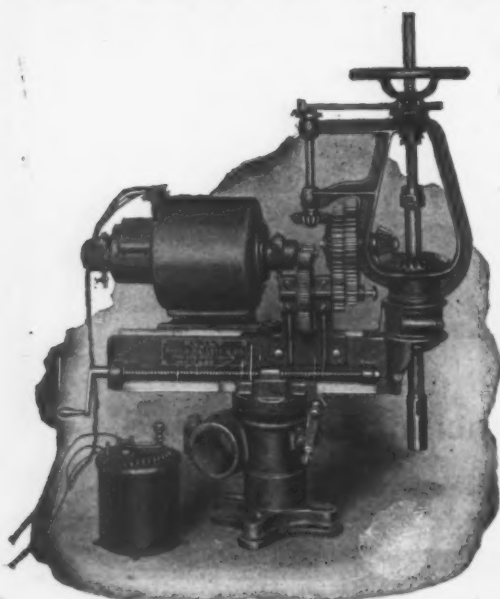
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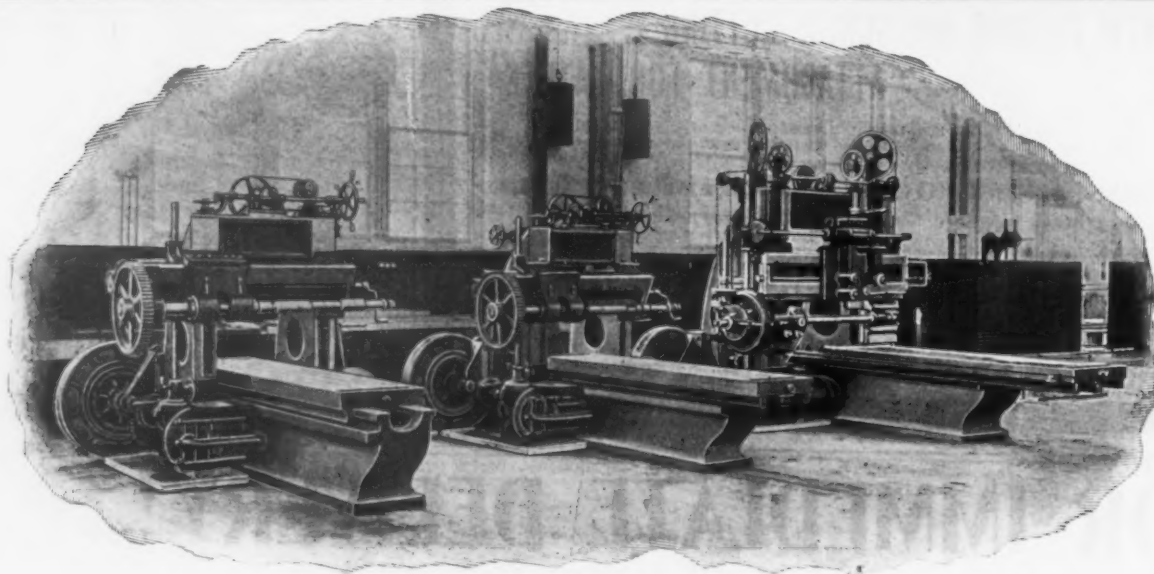
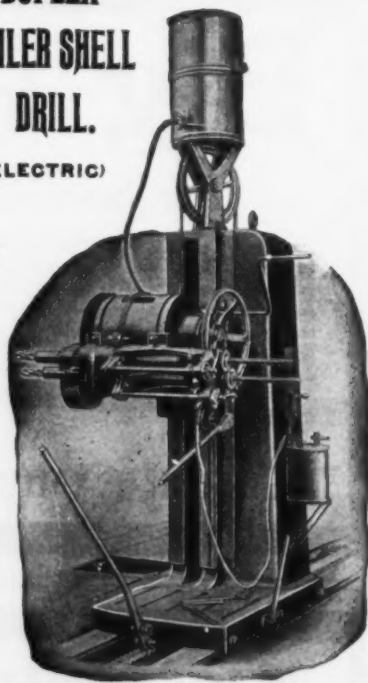
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in the shops of the General Electric Co., Schenectady, N. Y. Each machine is driven by an independent motor. We build this type of Milling Machine exclusively in sizes from 20 in. wide up to any width required. Send for new catalogue, which is free.

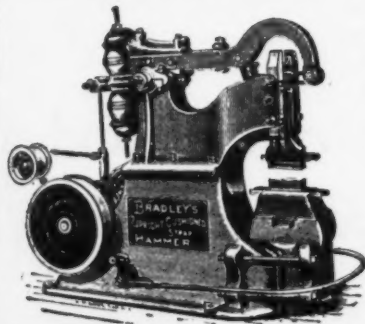
THE INGERSOLL MILLING MACHINE CO.,

P. O. BOX 350, ROCKFORD, ILLS., U. S. A.

EASTERN BRANCH, 126 LIBERTY ST., NEW YORK.

AGENTS: A. Janssens, Paris. C. W. Burton, Griffiths & Co., London. Gustav Diechmann & Sohn, Berlin.

BRADLEY HAMMERS



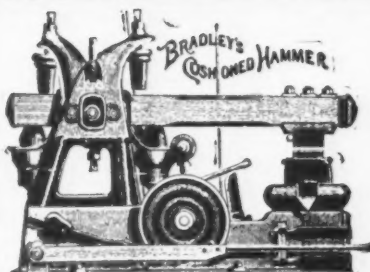
are made in Helve and Upright styles with heads weighing 15 to 500 pounds and forge stock $\frac{1}{8}$ to 5 inches diameter.

Each contains $\frac{1}{8}$ to $\frac{1}{2}$ more material than any other of same rating.

Their Anvil Blocks weigh nearly or quite double those of other Hammers.

Their output is guaranteed 25 per cent. greater than is possible with other Hammers of same rating, or no sale.

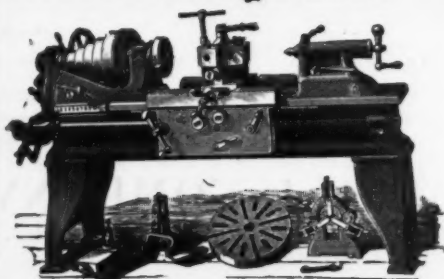
SEND FOR CIRCULARS.



FOREIGN AGENTS:
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BUCK & HICKMAN, Whitechapel Road, London.
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THE BRADLEY CO.
SYRACUSE, N. Y.

Interchangeable Turret and Compound Rest.



We carry in stock Turrets for 14 in., 16 in., 18 in., 20 in., 22 in., 24 in. Lathes, interchangeable with Compound rest, or for mounting on Bed. With Turret on Carriage, any of the thirty-six to fifty-five threads or feeds (according to size of Lathe) may be obtained. Sizes: 14 in. to 42 in. swing. Beds in even lengths.

THE LODGE & SHIPLEY MACHINE TOOL COMPANY, Cincinnati, Ohio, U.S.A.

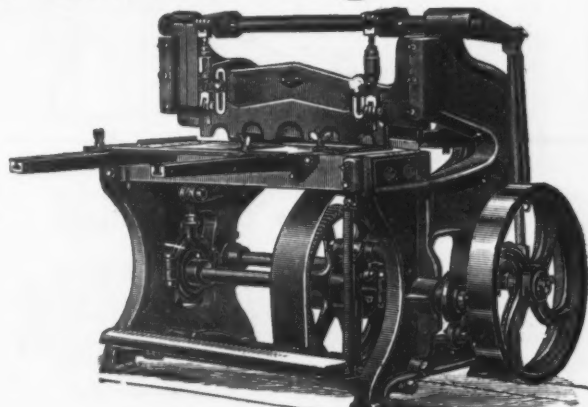
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Shears that Cut Sheets of Unlimited Lengths.



Fingers Foot Gap Sheet.

Capacities, 1-16 to 1-4 inch iron and lighter. Lengths, 30 inches to 10 feet.



The housings of these shears have a gap or open throat 15 inches deep. In addition to cutting and squaring sheets of sizes given above, sheets of unlimited lengths can be trimmed and split 15 inches from the edge or less.

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Mfrs. of Sheet Metal Tools.

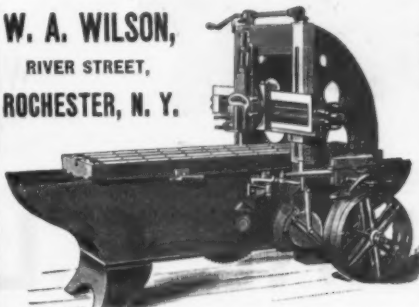
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"Cincinnati" Lathe.
"A good lathe at the right price."



16, 18 and 20 inch.
Write us,
if quality and price
will interest you.

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421-423 E. 2d St., CINCINNATI, OHIO.

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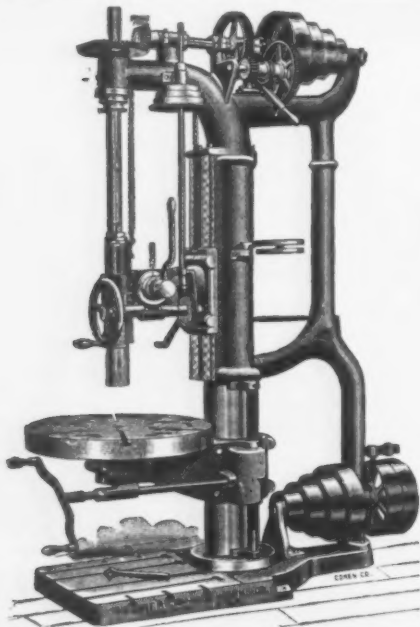
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SPEED LATHE.



Combination
Wheel and Lever
Tailstock.

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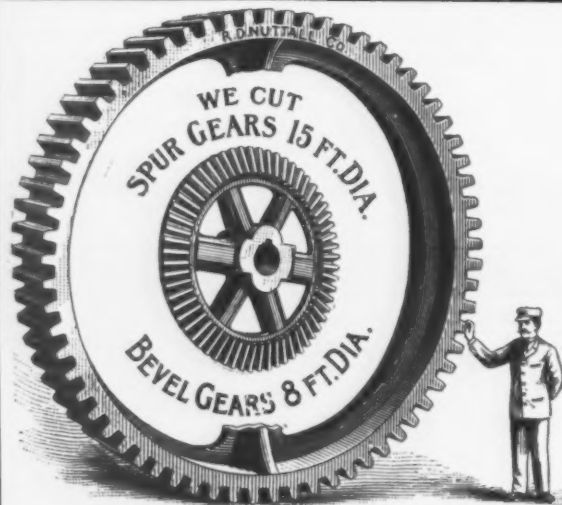


If you are buying equipment for a new shop or new tools for an old shop remember that we design and build nearly every kind and size of machine tool that you need.

The American Tool Works Co.

Works: CINCINNATI, U. S. A.

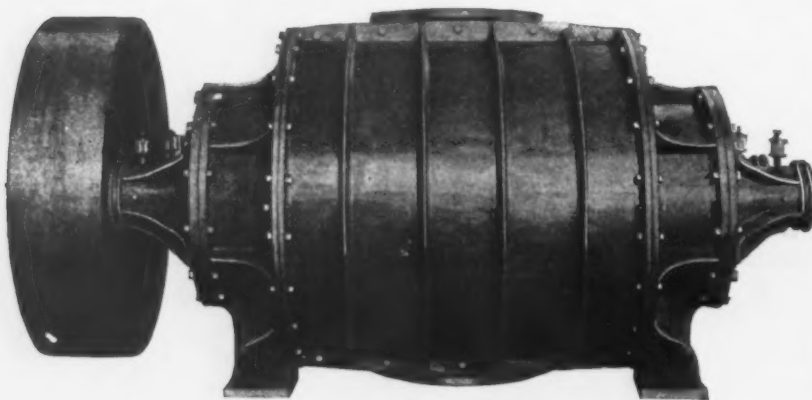
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GEAR CUTTERS.

(New Century Pattern.)



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The **Green Rotary Pressure Blower,**

And it weighs less, occupies less space, and is more positive in action than any other blower.

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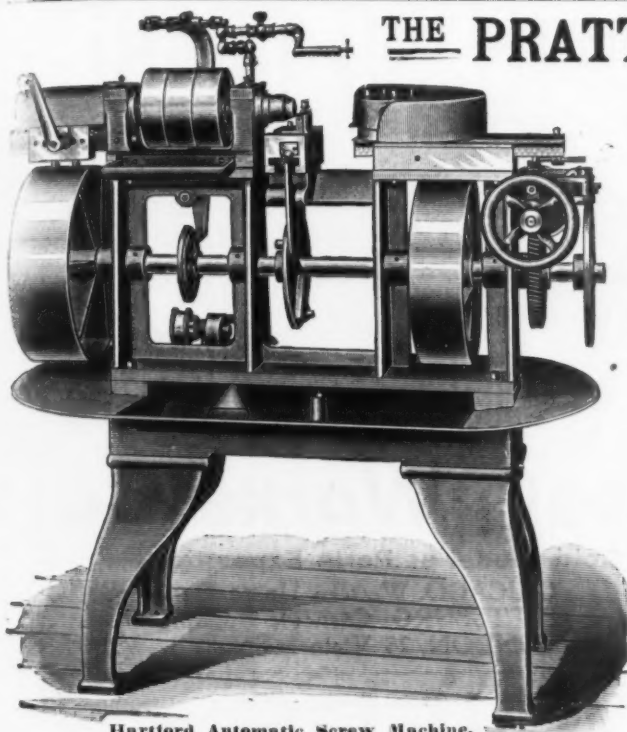
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 MACHINE
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WINDSOR, VT.
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Brass-Working Machinery.



Hartford Automatic Screw Machine.

THE PRATT & WHITNEY COMPANY, HIGH CLASS MACHINE TOOLS.

Hartford Automatic Screw Machines.

In ten sizes, for making Screws, Studs, Bicycle Hubs and other pieces of circular cross section and various outlines from bars of round, square or hexagon metal, in diameter 1-16 to 3 1-16 inches. All needed adjustments are provided for. One man can attend a half dozen machines.

Tools made to order for finishing pieces to sample.

Write for further particulars and "Hardware" Catalog.

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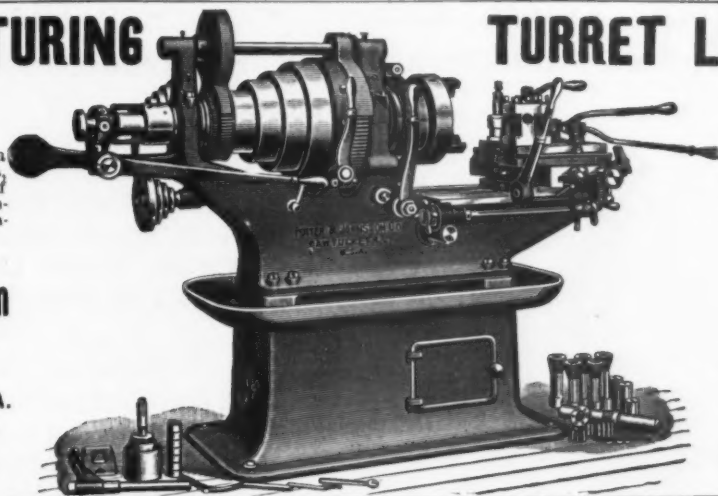
MANUFACTURING

TURRET LATHE.

THIS Lathe is made in a variety of combinations, and is adapted for all kinds of work ordinarily done on engine lathes or turret machines.

**Potter & Johnston
Company,**

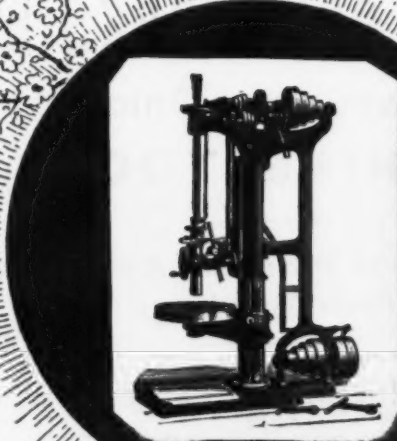
Pawtucket, R. I., U. S. A.
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Write for catalogue of our Universal Shaping Machines and Automatic Chucking and Turning Machines.

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THE Cincinnati

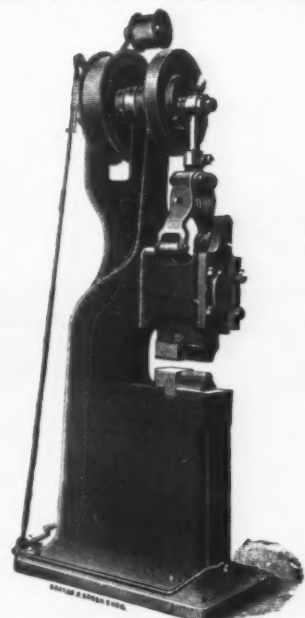
Is the most perfect drill now on the market. Other makers have good tools; but there's only one make that will do more than any other, that's ours. Write and see what we have to offer.

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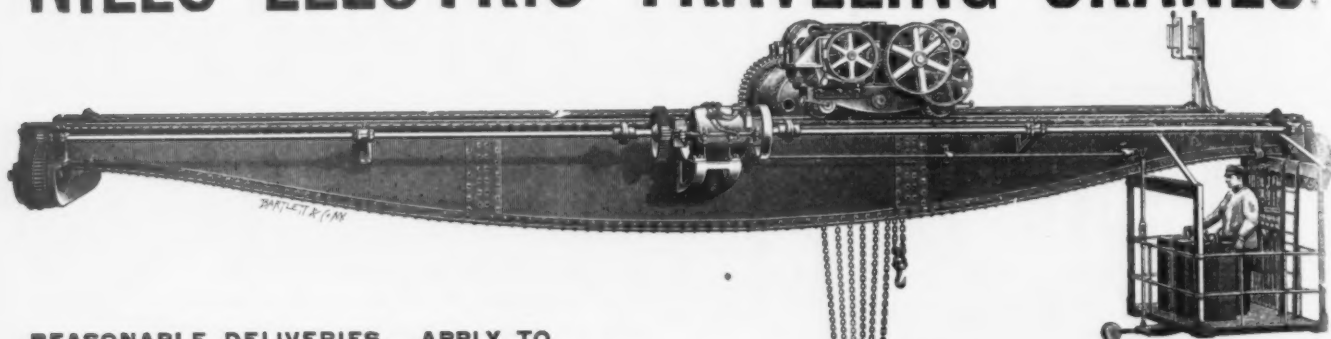
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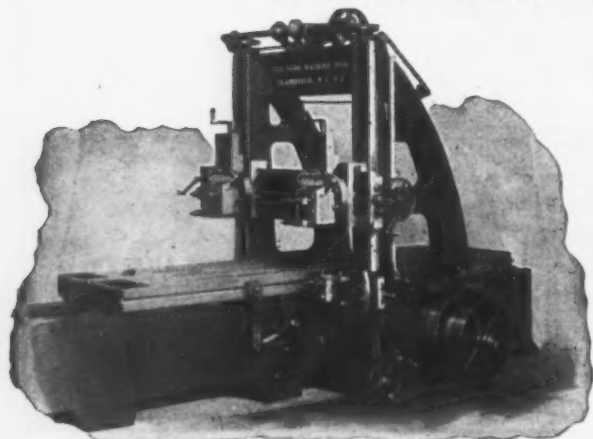
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Awarded Gold Medal at Paris Exposition.



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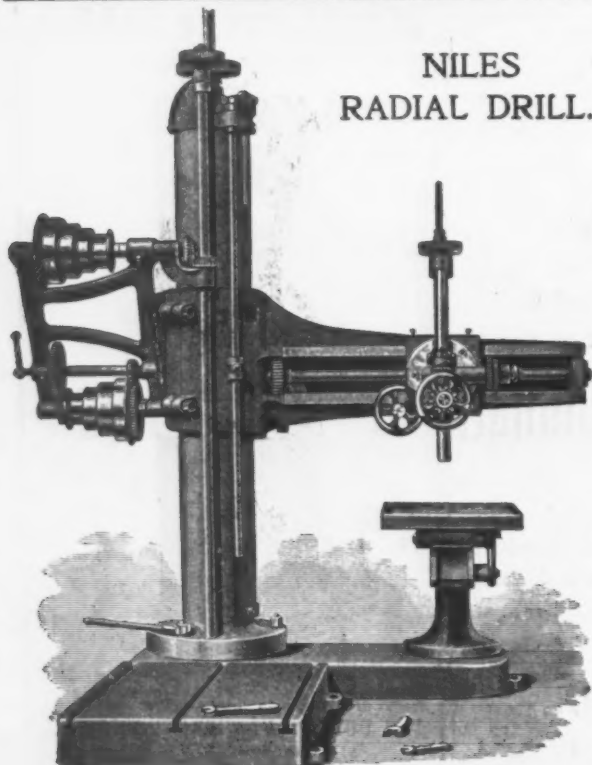
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Friction Driven Drilling Machines



No. 1 FRICTION DRILL.

Speed is varied by foot treadle, allowing the use of both hands to adjust and hold work.



No. 1 Drills from 0 to 3-4 inches.

No. 2 Drills from 3-8 to 1 1-4 inches.



No. 1 CODE WORD, "SAMSON."
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No. 2 FRICTION DRILL.

These machines have greatest power when speed is slow, and are most sensitive when speed is fast.

We build only one machine and only one size of that machine.

We believe no other machine tool builder in the world can make this claim, and we think said claim bears evidence of the truth of the following claims:

That every detail of its design and construction has been carefully developed during the nine years of continuous manufacture.

That it is a well built machine.

That it is a practical, convenient and harmonious combination.

That our machine is of great value to the purchaser.

That it is a paying investment.

We have some imitators, but the gap between our machine and others is still greater than that existing between man and the ape.

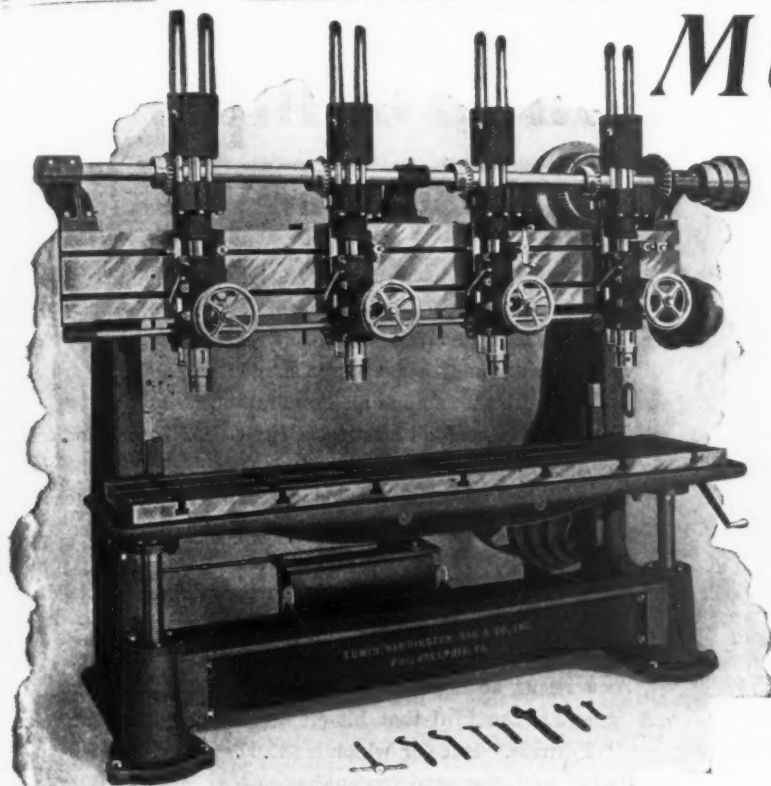
See also our advertisement on page 120, and send for copy of Rapid Lathe Work, which gives full description of our machine, which is called the Hartness Flat Turret Lathe.

We received Gold Medal at Paris Exposition of 1900.

There is no other Flat Turret Lathe made in America, and this machine is sold only by

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MADE IN 5 SIZES.

DRILLS A NUMBER OF HOLES AT ONCE.

SPINDLES HAVE INDEPENDENT LATERAL ADJUSTMENT ON CROSS HEAD, AND ONE OR MORE MAY BE USED AT THE SAME TIME, EACH SPINDLE IS COUNTERBALANCED, QUICK RETURN, AND FEED STOPPED AUTOMATICALLY.

TABLE RAISED AND LOWERED BY SPIRAL GEARS AND SHAFT.

Immediate Deliveries from Stock.

Write for Further Details.

EDWIN HARRINGTON, SON & CO., Inc.,
Machine Tools, Hoists, Overhead Tramway, Gear Cutting,
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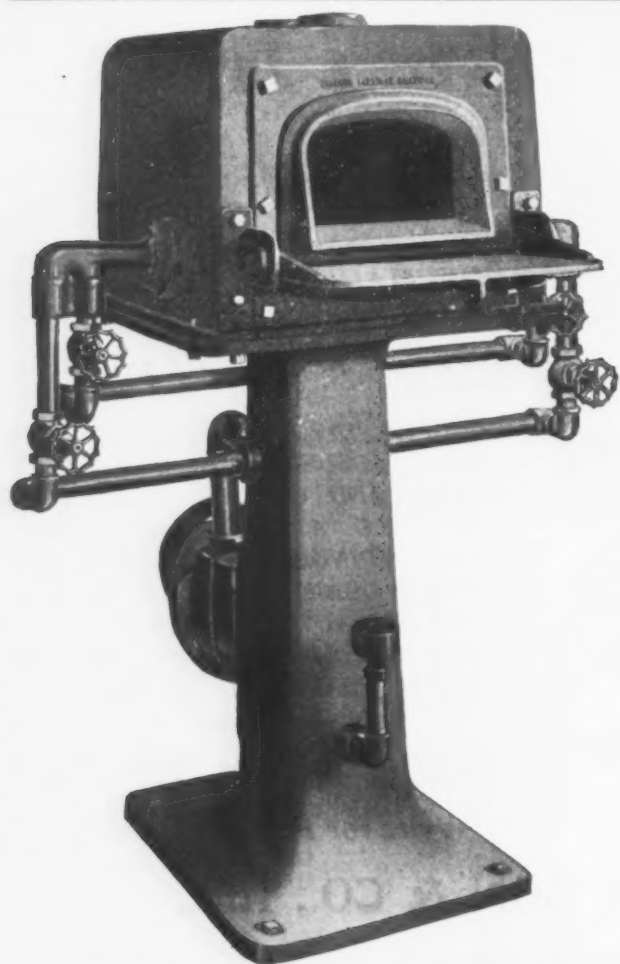


**OLIVER
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TRIMMERS
SAVE
MONEY
ON
PATTERNS**



There isn't the slightest doubt about Oliver Wood Trimmers saving money. Too large a proportion of the best concerns employing pattern makers have proved it. Don't put this matter aside, saying "We have one." If you haven't investigated our latest styles you have no idea of the marvelous improvement made. It is quite possible that the trimmer you have is an old style one. If so, you will lose more money by continuing to use it than a new one would cost. If you haven't any trimmer at all—well, you'd better get one quick. If you are skeptical, we will prove it to your satisfaction and at our expense. A little correspondence won't cost you much and will probably save you a great deal.

AMERICAN MACHINERY CO. GRAND RAPIDS MICH.



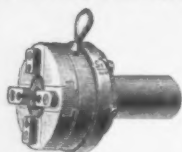
Don't Jump

on your Workman

If he spoils a tool in hardening.
Place the blame where it belongs.
You give him the latest machinery for making tools
But you ask him to heat them in an old fashioned coal or coke
open fire the same as his grandfather used.
You tell him he don't heat tools right. Of course not. He
knows that.
But you give this same workman a Stewart Gas Furnace and
ask him to temper a tool and watch the difference.
He goes about his job with confidence.
He knows he can regulate the heat to any degree required ;
He knows he has no ashes or coal to monkey with ;
He knows no flame can strike his tool and burn it.
As a result he does his work well ; he feels proud about it
and is thankful that his employer owns a Stewart Gas
Furnace. Price of which is \$85.00.
Hadh't we better send you one?
You will not regret it.
We make all sizes.

CATALOGUE FOR THE ASKING.

CHICAGO FLEXIBLE SHAFT CO., = 158-160 Huron St., CHICAGO.



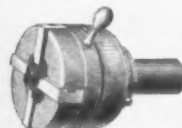
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Tools for Screw Machines

is most complete and up-to-date.

We make a special study of this class of tools.



Adjustable Self-Opening Screw Cutting

Die Heads for any size or style of thread ;
save 50% over solid dies.

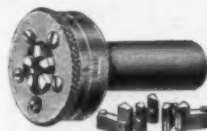
Adjustable Hollow Milling Tools,

various sizes, either for turret use or live spindle.



Adjustable Collapsing Taps,

many sizes and styles for turret or rotary use.



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Sole Manufacturers and Patentees,

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CLOSED.



The Best!

International Sprinkler Co.

(CONTROLLED AND MANAGED BY MERCHANT & CO., INC.)

MAIN OFFICES, - PHILADELPHIA.

"INTERNATIONAL" HEAD.
OPEN.



The Simplest!

THE INTERNATIONAL SPRINKLER.

The International Sprinkler Company, under the control and management of Merchant & Co., Inc., has increased its business at such a rapid rate that the old quarters were soon found entirely inadequate, and a large new mill was accordingly constructed. Some idea of the energy of the management may be gained from the fact that the orders received during the past two months more than equalled the business of the entire twelve months of 1899, a gain of over six hundred per cent. The accompanying cut shows the new factory which has just been finished. It is a very complete plant, thoroughly equipped with all modern appliances, which will enable the company to handle a very large tonnage of pipes, fittings, etc. In fact, its facilities are now second to none in the business. Every one interested in the protection of property against fire will do well to look into the merits of the "International." The sprinkler is approved by the various insurance bureaus throughout the country, while many credentials have been received from leading business houses in this and other cities attesting the excellence of the International's work. All information of this character will be furnished with pleasure to prospective customers. The company will continue to have its main office in this city, and has a Southern office in Atlanta, Ga. In addition it will have the advantage of the active co-operation of all the branch offices and the traveling representatives of Merchant & Co., Inc., which are located in the principal cities of this country. In conclusion it is almost needless to say that with Mr. Clarke Merchant at its head, and the general management in the hands of Mr. Powell Evans, the International Company has a strong practical management, abundant capital and is in the business to stay.

The following partial lists of contracts taken in the last few months, covering a wide range of buildings protected by every class of insurance, affords ample proof that the International Company is getting its share of the sprinkler business in the country to day.—(UNITED STATES REVIEW, Supplement.)

PENNSYLVANIA.

Electric Storage Battery Co., manufacturers storage batteries, Philadelphia.
Leicester & Continental Mills Co., woolen mills, Philadelphia.
John Wolstenholme & Sons, manufacturers worsted yarn, Philadelphia.
Hotel Walton, Philadelphia.
Quaker City Dye Works, Philadelphia.
Hensel-Colladay, repeat order, woolen mills, Philadelphia.
Smith, Kline & French Co., drugs, Philadelphia.
William Steele & Sons, Peter Woll, repeat order, Philadelphia.
Estate C. J. Graham, Philadelphia.
Robert Foerderer, manufacturers of leathers, Philadelphia.
George W. Smith & Co., cabinet makers, Philadelphia.
National Publishing Co., Philadelphia.
Ashley & Bailey Co., manufacturers of silk, York.
Noide & Herst, knitting mills Reading.
John Gay's Sons, Philadelphia.
Tuckman Bros & Faggen, Philadelphia.
Germantown Spinning Co., Philadelphia.
Bernstein Mfg. Co., manufacturers metal bedsteads, Philadelphia.
Peter Woll & Sons Philadelphia.
Greaves Bros, Philadelphia.
Marks Bros., repeat order, department store, Philadelphia.
John T. Bailey & Co., manufacturers bags, rope and twine, Philadelphia.
J. Kitchenman, manufacturer carpets, Philadelphia.
George Lasher, Philadelphia.
Enterprise Mfg. Co., manufacturers hardware specialties, Philadelphia.
R. T. Moorehouse, manufacturer of paper, Philadelphia.
Pennsylvania Salt Mfg. Co., manufacturers of chemicals, Natrona.
J. E. Thorne, Philadelphia.
J. R. Jones, Philadelphia.
Doonan Bros, manufacturers carpets, Philadelphia.
Millbourne Mills, Philadelphia.
W. C. Urner & Co., Spring Grove.
Hess's Mills, Philadelphia.
Thomas Miles Building, office building, Philadelphia.
T. B. Rice, repeat order, Philadelphia.
Standard Hokey Co., Philadelphia.
George Watkinson & Co., manufacturers rubber boots and shoes, Philadelphia.



FACTORY, PHILADELPHIA.

Dill & Collins, Philadelphia.
Lehigh Valley Silk Mills, Coplay.
Cambria Steel Co., manufacturers steel, Johnstown.
Otto Gas Engine Co., manufacturers engines, Philadelphia.

NEW JERSEY.

Crescent Belting and Padding Co., repeat order, manufacturer rubber goods, East Trenton.
Philadelphia Watch Case Co., Zarbrugg Co., Riverside.
Riverside Metal Co., Riverside.
Millville Mfg. Co., cotton mills, Millville.
Johnson & Johnson, New Brunswick, Manufacturing Chemists.

NEW YORK.

Buffalo Forge Co., Buffalo.
TENNESSEE.
Harriman Cotton Mills, Harriman.
MARYLAND.
Sharpe & Dohme, drugs, Baltimore.
American Tobacco Co., Felger Branch, Baltimore.

DISTRICT OF COLUMBIA.

Stumpf Bedding Co., manufacturers metal bedsteads, Washington.

VIRGINIA.

Richmond Locomotive & Machine Works.
Cotton Oil and Fibre Co., Norfolk.

NORTH CAROLINA.

Patterson Textile Co., cotton mills, Roanoke Rapids.
Roanoke Mills Co., cotton mills, Roanoke Rapids.
Ashley & Bailey Co., manufacturers silk, Fayetteville.
Nokomis Cotton Mills, Lexington.

SOUTH CAROLINA.

Buffalo Mills, cotton mills, Union.
Cheswell Cotton Mills, cotton mills, Westminster.
Capital City Mills, cotton mills, Columbia.
Laurens Furniture Co., Laurens.
Morgan Iron Works, Spartanburg.
Spartanburg Warehouse Co., Spartanburg.

TEXAS.

American Cotton Spinning Co., Denison.
Roxton Cotton Oil Co., Roxton.
McKinney Cotton Oil Co., McKinney.

CONNECTICUT.

Coe Brass Manufacturing Company, Torrington.

"INTERNATIONAL" HEAD.
SECTION.

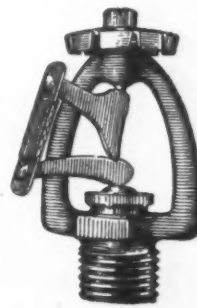


The Most Certain!!

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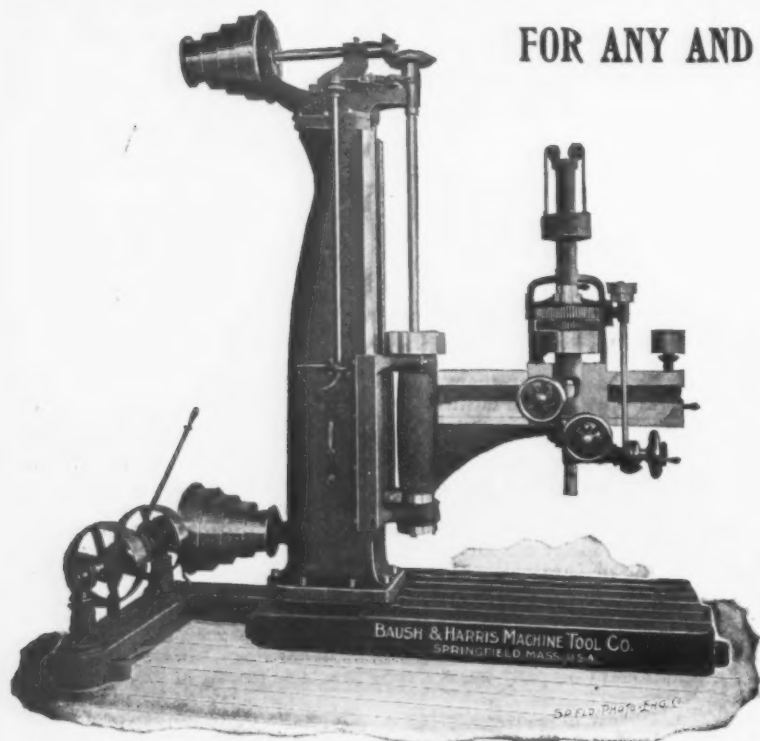
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RADIAL DRILLS

FOR ANY AND EVERY SERVICE.



No. 4 GEARED RADIAL DRILL.

Boring Mills

30 IN., 37 IN., 51 IN., 61 IN.

Multiple Drills

4 TO 24 SPINDLES.



BAUSH MACHINE TOOL CO.,

SPRINGFIELD, MASS., U. S. A.,

SUCCESSORS TO

Baush & Harris Mach. Tool Co.

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New York—85, 87, 89 Liberty St.
Chicago—22, 24, 26 Canal St.
Pittsburgh—Park Bldg.
Cleveland—26 So. Water St.

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Agents:**

SELIG SONNENTHAL & CO.,
London, E. C.—85 Queen Victoria St.
E. SONNENTHAL, Jr.,
Berlin, Germany.

MACHINE

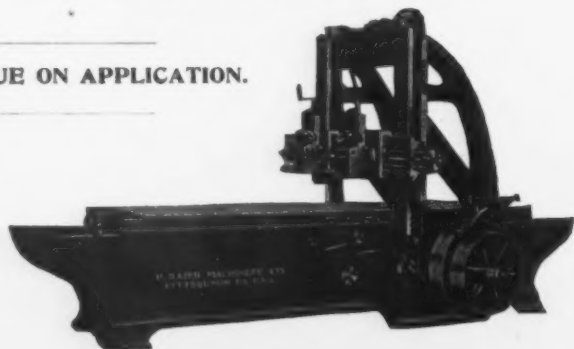
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LARGE STOCK FOR IMMEDIATE DELIVERY.

High Grade Labor Saving Machine Tools.

NEW AND SECOND HAND.

CATALOGUE ON APPLICATION.



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123-125 WATER ST.
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PENNA
U·S·A·**

TRADE PAPER ADY. AGCY. N.Y.-E

"LITTLE GIANT" LONG STROKE RIVETING HAMMER



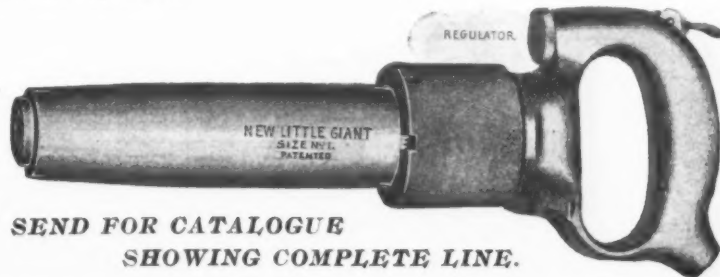
WILL DRIVE ONE-
INCH RIVET.

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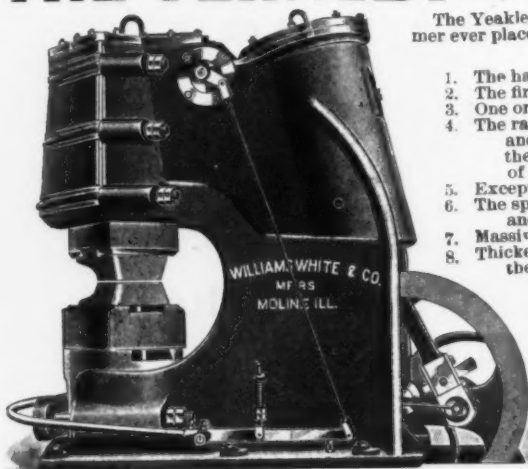
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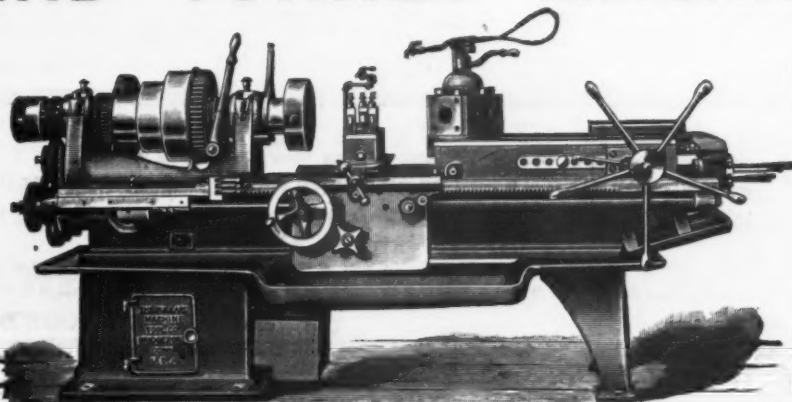
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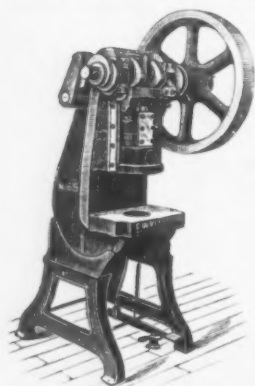
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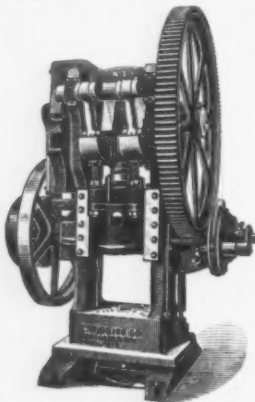


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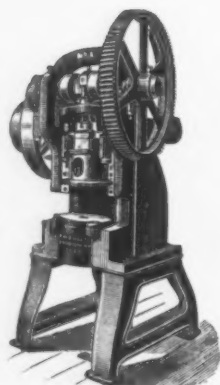
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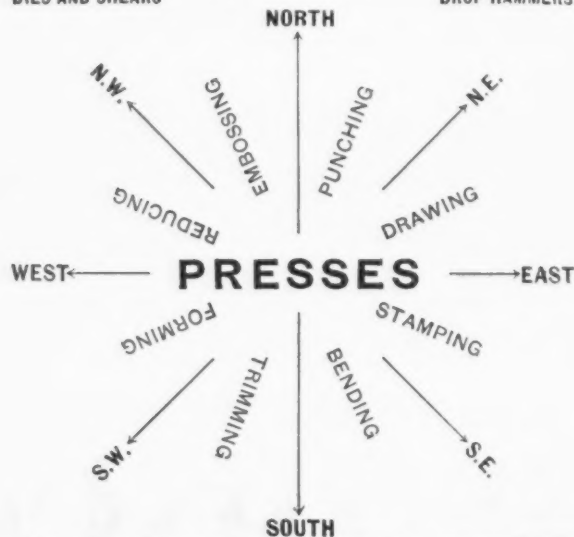
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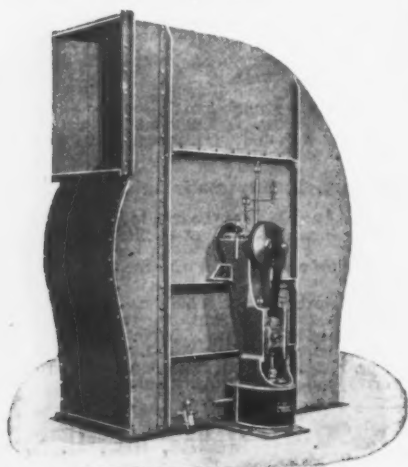


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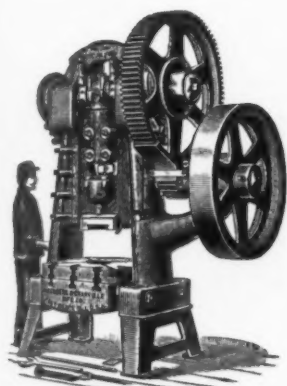
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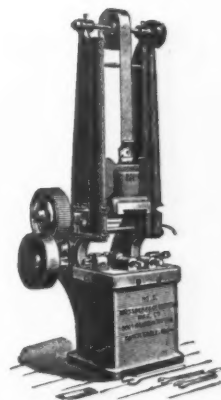
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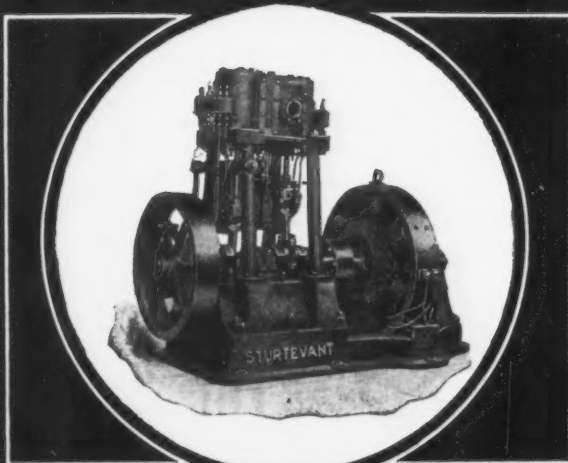


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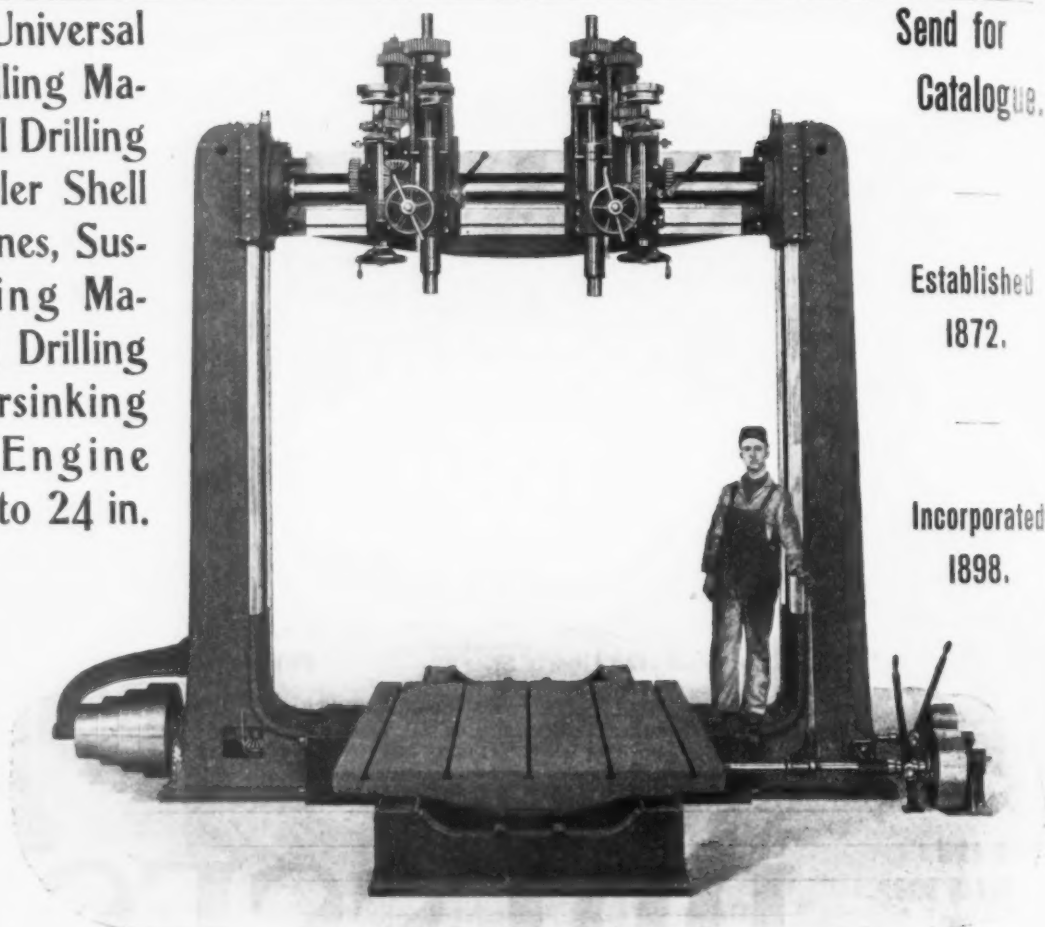


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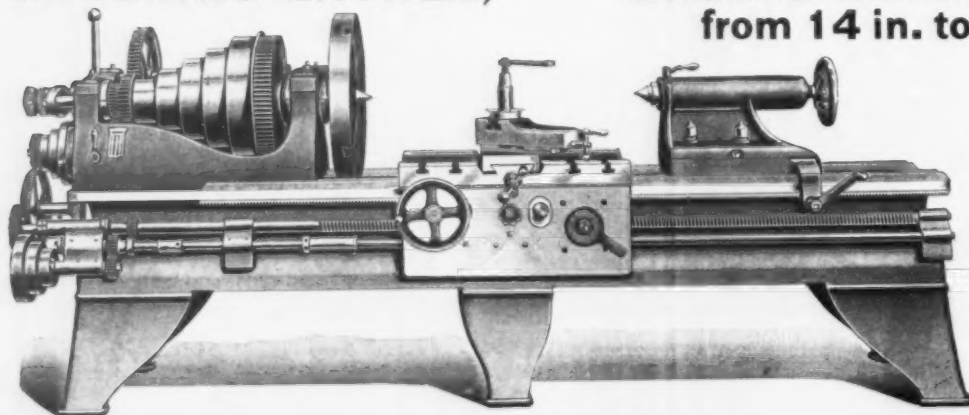
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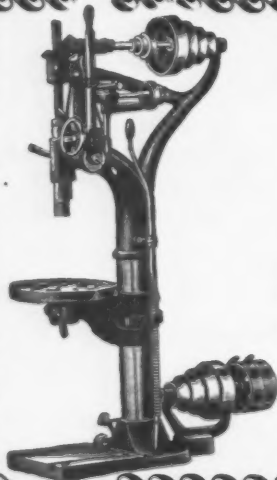
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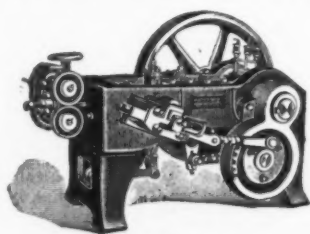
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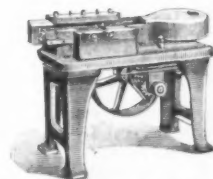
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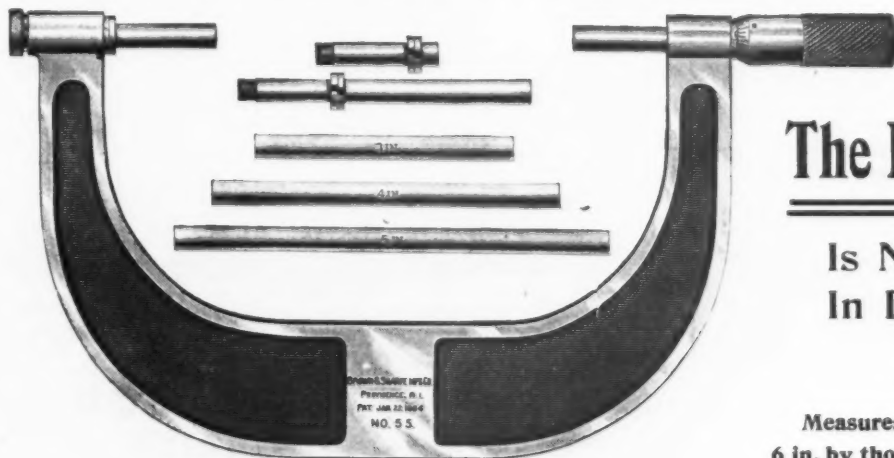
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1 Combined Punch and Shear, capacity $\frac{1}{8}$ in. holes in
 $\frac{3}{8}$ in. plate and shear $\frac{3}{4}$ in.
1 Combined Punch, Shear and Upsetter.

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114 in. and 24 in. x 14 in. x 18 in. Worthington Comp'd
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18 in. x 5 in. x 18 in. Cameron.
12 in. x 7 in. x 12 in. Buak.
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17 in. x 4 1/2 in. x 10 in. Plunger Pattern.
10 in. x 5 in. x 16 in. Deane Sinkers.
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50,000 Fire Brick, good as new.
500 feet 12 inch Cast Iron Bell Pipe.
300 New Sugar House Wagons.
Several large Iron Tanks, both round and square.

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Largest stock in America. Will be sold at **low** **prices**. These heaters are mostly taken in exchange for our improved Berryman (Kelly's Patent), "A Little Giant," vastly superior to all other feed water heaters, both as to results and durability.

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 No. 51 " " " "
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WE buy scrap rubber of all kinds as well as machinery, cars

as well as machinery, scrap iron, &c., removing entire plant where required.

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AT A BARGAIN.

1 Second hand Corliss Engine, 14 in. x 42 in.
1 Blake Stone Crusher, 15 x 9 with screen.
1 Dean Duplex Steam Pump, 5 x 3½ x 5.
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One right hand Wetherill Corliss Engine, cylinder 28 x 60; flywheel 20 feet diameter, weight 30 tons; shaft 15 in. x 12 ft. 6 in.; rope drive pulley 18 ft. diameter and grooved for 15 2-inch ropes; driven wheel 78 in. diameter grooved for 13 2-inch ropes; two iron idlers with boxes complete. With or without Independent Condenser 10x14x16.

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Eight 60 x 16 Horizontal Steel Tubular Boilers, complete, a bargain.
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Three 11 x 18 celebrated Straight Line Automatic Engines, complete, at a bargain.

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13 in. x 9 ft. Eng. Lathe, Stover.
20 in. x 10 ft. " " Fifield.
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Feed

20 in. B. C. Drill, Stover.
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3 No. 4 Mossberg Power Presses.
Gang Drills, Speed, Lathes, Grind-
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Second-hand Steam Engines, Boilers and
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2 Eaton and Prince Passenger and Freight Elevators.
2 Upright Marine Engines; also one 14 x 18, and one 12 x 20 Horizontal Engine.
Machinery bought, sold and erected.
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96 x 14 Wilmarth.
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Also fine assortment of
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60 x 46 x 10 r'ond, 2 Hds.
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Lot of light relaying rails.
Contractor's Plant For Sale or Rent.

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1 34 x 60 Right Hand Horizontal Engine with 24 ft. 30 ton fly wheel.
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Two Second-hand Horizontal Tubular Boilers, 48 in. diameter, 12 ft. 9 in. long, with 48 3 in. tubes. In good condition; prices low. Apply,
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445 K. W. Edison, Bi-polar, 110 volt dynamos.
1 New 40 K. W. Stanley, two phase, 3000 volt alternator.
1 400 ampere hour, Chloride Accumulator Co. storage battery.
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1 30 x 36 x 18 Ideal cross compound engine.
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1 1000 H. P. Austin open heater.

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42 inch Schellenback Pulley Lathe, Bores and turns simultaneously.
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1 32 in. x 32 in. x 8 ft. New Haven Planer.
1 42 in. x 42 in. x 14 ft. Gray Planer.
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Engine Lathes, 10 in. to 32 in. swing.
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Send for catalogue of Presses.

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Hoisting Engines?

We have fifteen smaller and medium sized Single, Double and Four Drum Engines in stock. Steam and Centrifugal Pumps? Twenty-four various sizes and makes.

Lidgerwood Cableway, 1,000 ft. span.
Boiler and Three Drum Engine.
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125, 80, 70, 60, 55, 50, 40, 35, 30, 25 and smaller Portable, Vertical and Horizontal Boilers.
225 pound Steam Hammer.
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JOHN H. CARLIN, Prop.,

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WANTED.

One second-hand 10 in Slotting Machine.
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One second-hand 24 to 30 in. x 20 ft. centers, modern Screw Cutting Engine Lathe.

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Special Bargains.**Second-Hand Tools.****LATHES.**

3 12 x 4 Speed.
1 12 x 6 Reed.
1 No. 3 P. & W., wire feed.
1 14 x 4 ft. 6 in. Putnam.
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1 14 x 6 Putnam.
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1 16 x 6 Brown.
1 16 x 6 Harrington.
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1 21 x 8 Bullard.
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1 26 x 12 Lathe & Morse.
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1 32 x 14 Pond.
1 B'ment Single Axle Lathe

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1 18 1/2 x 14 1/2 x 43 Ames Screw
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1 14 ft. 6 in. Sellers Plate.

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1 10 in. Bench, York.
1 3-spindle Ames.
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19 in. Crank, Bement.
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Branches at Chicago, Pittsburgh and Cleveland.

Second-hand Engines, Boilers, Iron and Wood Working Machinery**FOR IMMEDIATE DELIVERY.**

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1 18 in 7-hole Turret Head, with carriage, good order.
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THE W. P. DAVIS MACHINE CO.,

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Wanted to Make

We have a complete modern manufacturing plant near Boston, equipped with **Power Presses, Automatic Screw Machines, Nickel Plating and Polishing Plant** and want to correspond with parties having articles that can be made in such a factory. Address

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No. 1, capacity 300 tons daily, now running, making over \$5 per ton profit. Can be turned over promptly. Will pay half the cost this year.
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With well-developed ore mines and millions of tons of ore in sight and has also a large number of farms on the Cumberland and Tennessee Rivers. This property contains 40,000 acres and is a principality in itself.

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THICK VEIN COAL IN THE MONONGAHELA Valley.

In the 3d, 4th, 5th, 6th and 7th pools of the Monongahela River.

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In tracts of five, ten, twelve and seventeen thousand acres each, are cheap and are being sold rapidly to Eastern capitalists.

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FIFTEEN THOUSAND ACRES OF COAL in Centre and Clinton Counties, Pa., on the Beech Creek Railroad, suitable for shipment East.

TEN THOUSAND ACRES OF COAL on the main line of the Pennsylvania Railroad, containing four veins of coal, mostly above water. John Fulton, Mining Engineer of Johnstown, Pa., estimates over 80,000,000 tons of coal on this property. Will be sold cheap to a prompt buyer.

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ROOTS', second hand, bought, sold or exchanged.

All my blowers are overhauled by expert blower machinists.

I do not advertise a "fake" list of blowers not in my possession; my stock is constantly changing.

Write for particulars and prices.

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1 1/2 ton Yale & Towne Standard Gauge Locomotive Crane
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FOR IMMEDIATE SHIPMENT.

30 in. Bullard Swivel Head Turret Mill.
37 in. Bullard Mill, two heads.
42 in. Bullard Swivel Turret Head Mill.
76 in. Bullard Mill, two heads.
30 in. x 30 in. x 8 ft. Pond Planer, new pattern.
36 in. x 36 in. x 10 ft. Cincinnati Planer, two heads.
36 in. x 36 in. x 14 ft. Cincinnati Planer, two heads.
40 in. x 17 ft. Triple Geared Fish Engine Lathe.
No. 2 Blackford Radial Drill, plain.
No. 3 Blackford Radial Drill, plain.
No. 3 Blackford Radial Drill, full Universal.
No. 2 Cincinnati Plain Back Geared Milling Machine.
No. 3 Cincinnati Plain Back Geared Milling Machine.
No. 3 Cincinnati Full Universal Milling Machine.
33 in. Gould & Eberhardt "Victoria" Pattern Gear Cutter.
24 in. Gould & Eberhardt Extension Base Shaper.
No. 3 Colborn Key Seater.
24 in. American Turret Lathe.
30 in. x 16 ft. Lodge & Shipley Lathe.
36 in. x 12 ft. Lodge & Shipley Lathe, triple gears.
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Two in. Rotary Pump. Douglas 1 1/4 in. feed Power Pump. Douglas 1 1/4 in. feed Power or Hand Pump. 7 in. x 8 in. Gould Triplex Power Pump. 4 in. x 5 in. Baldwinville Power Pump. No. 5 Acme Valley Pump. No. 2 Acme Valley Pump. Hall Air Pump. 5 in. x 7 in. Cylinder. Knowles Duplex Pump and Receiver, cylinder 4 1/4 in. x 2 1/4 in. x 4 in. Valley Duplex Steam, cylinder 5 1/4 in. x 8 in. x 5 in. Dean No. 2 Steam Cylinder. Knowles Steam Cylinder. Ames Steam Cylinder. Write for list.

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DEALERS IN

New and Second-Hand Machinery
PROVIDENCE, R. I.

For Quick Sale.

BRICK PLANT.

Henry Martin Brick Machine, 25,000 cap.
Pug Mill, Newton Sander, turn table, \$300.

ELECTRIC PLANT.

Hor. Arc Light, 35 Light T. H. Dynamo.
50 H. P. Westinghouse Compound Engine, \$600.

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Two 75 H. P. Horizontal Tubular Boilers, good for 90 lb. steam pressure, \$400.

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20 ton Howe Track Scale, \$90.

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WE WILL SELL CHEAP.

1 Marion Shovel, 3/4 yd.; one, 1 1/4 yd.
1 Porter 15 ton Standard Gauge Locomotive.
1 50 ton Locomotive, Standard Gauge
25 Flat Cars, 40 and 50 capacity.
1 8 1/2 in. x 10 in. Lidgerwood Hoisting Rig.
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45 ton Drop Bottom Coal Buckets.
Engines, Dynamos, Motors, Tools.
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Rivet Machines. State make, capacity and price.

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Special Bargains.

3 66 in. Power, Back geared, Squaring Shears. Good order.

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1 80 in. Lathe, rod feed, triple geared.

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50 H. P. Horizontal Tubular Boilers, guaranteed.....\$225
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100 H. Receiving Tank, 150 lbs. test..... 60
18 x 6 "New Haven" Lathe..... 85
36 in. "Stevens" Pulley Lathe..... 75
60 in. "Huyett & Smith" Ventilating Fan..... 40
10 H. P. Upright Side Crank Engine, new..... 70
15 H. Submerged Flue Upright Boiler..... 70
No. 3 "Sturtevant" Blower..... 18
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Slate Sensitive Drill and Chuck..... 25
20 in. x 20 in. x 4 feet Iron Planer, not complete..... 80
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15 H. Upright Boiler, complete with fittings..... 80
4 ft. x 15 in. Planer Chuck, heavy..... 15
12 in. Upright Drill..... 15
10 H. Sterling Charter Gas Engine..... 200
Wire Straightener..... 10
Strapper and Belt complete, new..... 12
Berryman Heater, 24 in. x 100 in., almost new..... 100
and many others.

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PARTIAL LIST OF SECOND-HAND MACHINERY IN STOCK.

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2 125 H. P. 66 x 18 Tubular Boilers.
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1 30 H. P. 8 x 10 Payne Auto. Engine.
2 No. 6 Morris Centrifugal Sand Pumps.
1 12 x 12 x 10 Worthington Duplex Pump.
1 7 x 4 1/2 x 10 Worthington Duplex Pump.
1 Deane Duplex Power Pump, 5 in. plungers.
1 No. 7 Cook and Chick Single Pump.
1 200 H. P. Berryman Feed Water Heater.

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Rolling Mill Engines

2 40 in. x 72 in. International Power Co. Corliss Engines. Shafts 20 in. dia., 8 ft. between center of bearings. Wheels 24 ft. dia., 50 ton. 1 Right hand, 1 Left hand.

1 18 in. & 30 in. x 16 in. Westinghouse comp'd.
3 16 in. & 27 in. x 18 in. Westinghouse comp'd.
1 24 in. & 38 in. x 60 in. Tandem, Allis, Tangye frame
1 26 in. x 48 in. Allis Corliss, Right hand, condensing. Wheel 18 ft. dia., 32 in. face.
1 10 1/2 in. x 25 in. x 15 in., Cross Compd. Armington & Sims.
1 11 in. and 19 in. x 24 in. Tandem Compd., Buckeye.
1 16 in. x 42 in. Allis Corliss.
1 10 in. x 12 in. Watertown Automatic.
1 12 in. x 13 in. N. Y. Safety "
1 13 in. x 15 in. McIntosh-Seymour Automatic.
2 13 in. x 14 in. Watertown "
1 14 in. x 13 in. Armington & Sims "
1 15 1/2 in. x 16 in. N. Y. Safety "
4 16 in. x 16 in. Ball "
2 16 in. x 16 in. Cooper "
1 18 1/2 in. x 18 in. McIntosh-Seymour "

BOILERS.

2 375 H. P. Sterling Water Tubes for 150 lbs.
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2 200 H. P. National "
3 72 in. x 16 ft. Return Tubulars " 120 "
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141 BROADWAY, N. Y. Factory, Brooklyn.
SEND FOR CATALOG.

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30 x 72 Harris Condensing Corliss.
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26 x 48 Hamilton Corliss.
24 x 48 Hamilton Corliss.
20 x 42 Hamilton Corliss.
18 x 42 Harris Corliss.
16 x 42 Bullock Corliss.
15 x 24 Watertown Automatic.
14 x 30 (summer) 4 valve Automatic.
13 1/2 x 26 Buckeye Automatic.
18 x 20 Mansfield Slide Valve.
12 x 16 Slide Valve.
10 x 12 Slide Valve.

The above are all in first-class condition and ready for shipment.

A. L. DAWSON & CO.,
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For Quick Delivery.

SINGLE VERTICAL PUNCHES.

36 in. throat, 1 1/4 in. in 1 inch plate.
30 in. throat, 3/4 in. in 1/2 inch.
24 in. throat, 3/4 in. in 1/2 inch.

SPLITTING SHEARS.

For 3/4 in. and 1/2 in. plate.

DOUBLE ANGLE SHEAR for 4 x 4 x 5/8 in. angles.

Plate-edge Beveling Shear, for 3/4 in. plate.
Gate Shear and Multiple Punch, 78 in.

BENDING ROLLS, 100 in., for 1 1/4 in. plate.

Hand Spacing Table, 8 ft.
Boiler Makers' Flanging Clamps, 10 ft.
Steam Riveter, 6 1/4 ft. gap.
Plate Planer, 6 ft. cut.
Duplex Vertical Engines, 9 x 9.

HILLES & JONES COMPANY,
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BOILERS—ENGINE.

2 60 in. by 22 ft. Boilers; have 18 6 in. flues and Hawley Down Draft Furnaces.

1 30 in. by 48 in. Hamilton Corliss Engine, with 18 ft. Band Wheel, 24 in. face.

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W. C. Johnson & Sons Mach'y Co.,
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- 1 No. 4 Clayton Duplex Air Compressor, 14 in. x 14 in. x 15 in., capacity 450 cu. ft. per min.
- 5 Double Rapid Bolt Cutters.
- 7 Single " " "
- 4 Double Solid Die Bolt Cutters.
- 4 Pointing Lathes.
- 5 Tappers.
- 1 46 in. x 17 ft. Engine Lathe.
- 9 2-Spindle Iron Table Snappers.
- 9 Speed Lathes.

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Good Tools !

Low Prices !

- 1 34 in. Triple Geared Engine Lathe.
 - 1 No. 5 Williams & White Bulldozer, Nearly New.
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 - 1 18 in. Traveling Head Shaper, 72 in. Traverse.
 - 1 100-lb. Power Helve Hammer
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- All second-hand, in good order.
Write for complete description.
We have a large stock—send us your inquiries.

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Feed-Water HEATERS

2nd-hand as well as new. All tested and guaranteed. BERRYMAN HEATERS a specialty. Our prices with surprise and please you.

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SPECIAL LIST NO. 1

Arc Dynamos.

2 American Wood, 30 light, 2,000 c. p.
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2 3 A. Slattery, 1,300 light, with exciters.
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Direct Current, 110 Volts.

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One second-hand Engine, H. K. Porter Company's make; Saddle Tank, Standard Gauge, Steam Brake, good condition, ready to operate, weight about 55,000 lbs. Apply J. B. BOOTH & CO., German National Bank Bldg., Pittsburgh, Pa.

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Must be Sold at Once.

1 12 x 5 Reed Lathe.
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1 14 in. Shaper, Walcott.
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1 Johnson Bulldozer.
Wanted—Power Press, capacity 24 to 30 tons.
THE RACINE MCH. CO.,
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Manufacturers using iron, steel or wood will find the best locations for successful plants along the

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These locations lead in cheap raw material, cheap, contented and desirable labor, cheap fuel and in good facilities for marketing products. Opportunities now open for establishing new plants are fine and should be investigated. Other investments will prove profitable in the South.

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8 Steam Pans, 20 ft. x 8 ft., with 3 1/4 in. Steam space
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Harrisburg, Pa. An Ideal Shipping Point

Have you ever experienced the need of a central distributing point for the eastern field? Many manufacturers now carry stocks of goods here. The best located man often gets the trade. You can RENT Large, Centrally Located Warehouses with attendants, of us, or you can BUY our former plant (we now occupy our new factory), well located for manufacturing or warehouse purposes. HARRISBURG FOUNDRY AND MACHINE WORKS

Wanted Partner

In an old established business; one who can furnish \$25,000. Business is paying \$1000 per month. Money will be returned as fast as profits accumulate. Good reference required and will be given. Business is Hardware and Cutlery in Conn.

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One Pond Planer, 36 x 36 x 17 ft.

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One vertical Engine 14 x 14, roughtry valve, self contain.

One Sturtevant Steel Blower, 68 in. high, 26 inlet, 22 outlet.

Also one Atlas 10 x 12 Engine.

Also a large lot of iron tanks.

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SECOND-HAND, FIRST-CLASS ORDER

800 lb. Pratt & Whitney board lift automatic Drop Hammer.
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14 in. Brown & Sharpe Screw Machine, without wire feed.

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Write us for any machinery wanted, or if you wish to exchange or sell.

C. C. WORMER MACHINERY CO.,

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FOR SALE.

Four trains of plate rolls.
One 9 ft. Fly wheel, new 7 in. bore; weight, 6,000 lbs.

One Rod Straightening Machine, built by the Medart Patent Pulley Co. for straightening Rods up to 3 in. diameter and 25 ft. long.

A lot of extra cold and hot plate rolls, new.

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18 in. x 48 in. Allis-Corliss Engine.
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2 x 18 H. S. and G. Plain Slide Valve Engine.
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12 in. x 7 in. x 10 in. Worthington Duplex Pump.
1000 lb. Ferris and Miles Steam Hammer.

Also a number of smaller Engines and Pumps.

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FOR SALE. Power Plant, Cheap.

One Engine, Cylinder 16 in. by 30 in.; governor; 8 ton fly wheel (more or less), 11 ft. dia. extra strong in section; band pulley 18 in. face, 8 ft. dia.

One Pierce, Stillwell Water Heater. 15 ft. of 3 in. Shafting, coupling and boxes. One Pulley, 12 in. face, 36 in. dia. One Pulley, 18 in. face, 30 in. dia. Stone foundation Capping, 53 ft. of extra double 18 in. Belting.

One Boiler, 14 ft. long, 60 in. dia; 32 flues; steam drum 14 in. dia., 12 ft. long; water column; safety valve; front; breeching. Iron Chimney, 28 in. dia., 60 ft. long. One Pump and all connections full capacity for boiler. Will be sold very cheap.

A machine shop and boiler makers' statement will be given as to condition.

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Root Blowers Nos. 1/4, 1/2, 1, 2, 4, 5 and 6.
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10, 15 and 20 horse Vert. Greenfield Engines.
6 horse Holsting Engine, nearly new, cheap.
8 horse Fort. Engine and Boiler, complete.

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Every piece of machinery purchased from us leaves our shops in absolutely perfect condition; every tiny detail having received our careful attention.

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WE OFFER THE FOLLOWING FOR QUICK ACCEPTANCE:

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No. A 120 6 x 12 Blymer.
No. A 122 9 x 14 Woodbury.
No. A 123 7 x 7 slide valve.
No. A 195 6 x 10 Westinghouse Junior.
No. A 197 24 x 54 side crank.
No. A 199 8 x 16 Russell Gibbs.
No. A 200 9 x 14 side crank.
No. A 204 8 x 14 center crank.
No. A 206 18 x 28 Nicol, Burr & Co.
No. A 207 6 x 10 side crank.
No. A 213 21 x 32 Watertown.
No. A 214 7 x 10 side crank.
No. A 215 12 x 20 side crank.
No. A 217 10 x 14 center crank.
No. A 270 20 x 24 Erie City.
No. A 273 12 x 12 Ideal.
No. A 274 12 x 12 Phoenix Iron Works.
No. A 275 10 x 14 Wright & Adams.
No. A 278 9 x 16 link motion.
No. A 282 5 x 7 side crank.
No. A 296 6 x 8 Ottumwa Iron Works.
No. A 306 6 x 12 side crank.
No. A 309 10 x 18 side crank.
No. A 316 13 H.-P. Dayton gasoline.
No. A 318 4 x 3 gasoline.
No. A 325 12 x 18 side crank.
No. A 326 8 x 12 Webster, Camp & Lane double cylinder hoisting.
No. A 355 12 x 16 side crank.
No. A 357 10 x 14 Sutlee Engine Company.
No. A 359 16 x 36 patent gear valve motion.
No. A 371 5 x 9 side crank.
No. A 376 1 15 H.-P. Westinghouse Junior.
No. A 377 14 x 14 Ideal.
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No. A 381 12 x 22 Tange bed automatic.
No. A 382 44 x 10 side crank.
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No. A 435 11 x 18 x 16 McEwen tandem compound.
No. A 439 10 x 12 Ball automatic.
No. A 440 9 x 16 Rice automatic.
No. A 441 16 x 36 Corliss.
No. A 443 1 double cylinder 50 H.-P. Raymond gasoline.
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No. A 449 34 x 4 center crank.
No. A 457 6 x 8 double cylinder hoisting.
No. A 448 5 x 12 upright.
No. A 467 2 x 3 upright.
No. A 600 13 x 18 single valve Russell.
No. A 601 14 x 20 4-valve Russell.
No. A 602 1 221 x 36 Wright automatic Corliss.
No. A 603 14 x 20 Struthers, Wells & Co.
No. A 604 104 x 12 Taylor Beck automatic.
No. A 608 13 x 22 x 13 two Westinghouse compound.
No. A 609 171 x 24 two Williams automatic.
No. A 466 5 x 12 upright, 12 x 24 inch floor space.
No. A 352 9 x 14 center crank.
No. A 349 6 x 8 double engine hoisting.
No. A 342 15 x 32 side crank.
No. A 202 8 x 10 elevator double hoisting, with drum.
No. A 198 14 x 2 marine type.
No. A 201 8 H.-P. gasoline.
No. A 127 8 x 12 automatic side crank.
No. A 455 Payne automatic compound.
No. A 476 10 x 24 Greenwall side crank.
No. A 501 12 x 16 F. C. Wells side crank.
No. A 482 20 x 30 Poppet valve motion.
No. A 487 Ten 9 x 12 Tiff center crank.
No. A 479 10 x 20 side crank.
No. A 480 5 x 12 side crank.
No. A 486 114 x 14 center crank.
No. A 502 Two 8 x 16 side crank.
No. A 503 16 x 25 side crank.
No. A 485 10 x 22 side crank.
No. A 504 6 x 8 side crank.
No. A 505 6 x 12 side crank.
No. A 506 7 x 12 Rice aut. Tange bed.
No. A 611 84 x 14 x 12 McEwen tandem.
No. A 612 5 x 5 marine.
No. A 613 8 H.-P. Otto gas.
No. A 614 Two 300 H.-P. Westinghouse auto.

ELECTRICAL.

No. A 220 15 H.-P. electric motor, Keystone No. 344, with worm gear for hoisting.
No. A 221 1200-light, Slattery alternator.
No. A 222 50 K. W. dynamo.
No. A 223 Two U. S. Westinghouse 80 K. W. generators.
No. A 224 Hancock inspirator, 1 1/2 inch.
No. A 225 500-light National dynamo.
No. A 226 400-light Thom. Houston dynamo.
No. A 227 500-light Thom. Houston dynamo.
No. A 228 150-light U. S. Weston dynamo.
No. A 229 Outfit consisting of 84 x 14 x 12 McEwen tandem compound engine with 60 K. W. direct connected dynamo and 100 H.-P. Sterling boiler.

LATHES.

No. A 262 1 10 in. x 4 ft. metal lathe.
No. A 454 1 16 in. x 6 ft. metal lathe.
No. A 256 1 20 in. x 7 ft. metal lathe.
No. A 260 1 14 in. x 5 ft. Pond engine lathe.
No. A 261 1 16 in. x 5 ft. Ames engine lathe.
No. A 266 1 20 in. x 4 ft. Franklin plane lathe.
No. A 259 1 20 in. x 10 ft. Shepard.
No. A 341 1 16 in. x 6 ft. screw cutting engine lathe.
No. A 339 2 18 in. x 8 ft. Shepard screw cutting engine lathes.
No. A 402 2 12 in. x 4 ft. special lathes for brass turning.
No. A 338 1 tapping lathe with compound gears.
No. A 310 1 12 in. x 4 ft. Barnes foot power wood turning lathe.
No. A 363 1 wood turning lathe, 4-step cone pulleys.
No. A 267 1 special lathe for wood work, 18 in. x 5 ft.
No. A 264 1 6 in. x 4 ft. speed lathe.
No. A 401 2 12 in. x 4 ft. 6 in. speed lathes.
No. A 387 2 12 in. x 5 ft. speed lathes.
No. A 403 2 14 in. x 5 ft. speed lathes.
No. A 406 2 16 in. x 4 ft. extra heavy speed lathes.
No. A 392 1 12 in. swing turret speed lathe.
No. A 404 1 13 in. swing turret speed lathe.
No. A 400 1 14 in. swing turret speed lathe.
No. A 396 5 4 ft. 6 in. bed turret speed lathes.
No. A 398 2 7 in. x 5 ft. turret lathes.

STEEL TANKS.

No. A 148 4 60 in. diam. x 4 ft. 6 in. high.
No. A 144 2 48 in. diam. x 7 ft. high.
No. A 142 1 30 in. diam. x 4 ft. high.
No. A 141 1 36 in. diam. x 5 ft. 4 in. high.
No. A 140 2 66 in. diam. x 5 ft. 2 in. high.
No. A 138 6 48 in. diam. x 8 ft. high.
No. A 141 4 42 in. diam. x 14 ft. high.
No. A 121 4 48 in. diam. x 6 ft. high.
No. A 111 7 22 in. diam. x 6 ft. high.

MISCELLANEOUS TOOLS.

No. A 390 Double buffer or polishing stand, 48 in. mandrel.
No. A 389 Double buffer, 24 in. mandrels.
No. A 393 Double spindle brass shaper, pulley 6 in. diam., 3 in. face.
No. A 395 Polisher or buffer.
No. A 459 Brazing outfit, tank and four burners.
No. A 173 Rod or bolt tapping machine, thread up to 1 1/2 in.
No. A 128 6 bolters or rattlers, solid cast iron, 4 ft. long, 24 in. diam.
No. A 434 1 hydraulic press, 2 x 3 ft., capacity 9 tons.
No. A 363 1 power drill press, 20 in. swing.
No. A 370 1 Yankee drill press, 20 in. swing.
No. A 369 1 hand power post drill press, 20 in. swing.
No. A 340 1 rod bolt threader up to 1 1/2 in.
No. A 343 1 Hotchkiss trip hammer, graded to strike 2000 pounds.
No. A 346 1 cold steel saw, 48 in. diam., with 4 saws.
No. A 348 1 set of hot rows for angle irons.
No. A 368 1 double emery stand, 36 in. long.
No. A 388 1 surface emery grinder, takes in 12 in. wheel.
No. A 248 1 double armor buffing or emery grinder.
No. A 227 3 hand power pipe threading machines, from 1/2 to 2 in.
No. A 226 1 pulley key seater, up to 3 in.
No. A 344 1 pulley key seater, any diam., 3 in. face.
No. A 421 1 belt tightener, 2 ft. 6 in. long.
No. A 458 1 tinners' power rollers for straightening, 9 ft. long.
No. A 410 1 power grinding stone, 28 in. stone.
No. A 468 1 power grinding stone, 16 in. stone.
No. A 372 1 boiler maker's power roll, 42 in. long.
No. A 334 1 extra heavy tire shrinker, 4 in. wide.
No. A 409 1 tire bender for 2 1/2 in. tire.

FANS AND BLOWERS.

No. A 159 1 48 in. power ventilating fan.
No. A 277 1 No. 9 Smith hot blast apparatus.
No. A 10 10 blowers, Chattanooga No. C14.
No. A 9 1 Gleason & Bailey blower, No. 9.
No. A 25 10 hand power blowers, Hoffman, 14 in. diam.
No. A 45 1 54 in. Garden City window ventilating fan.
No. A 21 1 No. 3 Sturtevant blower.
No. A 354 1 No. 5 Sturtevant blower, noiseless.
No. A 11 1 No. 7 Sturtevant blower, noiseless.
No. A 423 2 No. 7 Buffalo noiseless blowers.
No. A 61 1 No. 8 Buffalo blower.

No. A 124 1 No. 9 Buffalo cupola and fange blower.
No. A 51 1 No. 10 Buffalo blower.
No. A 8 1 10 in. Buffalo blower.
No. A 300 7 Andrews & Johnson steam driven exhaust fans.
No. A 7 1 No. 1 Champion blower.

AIR COMPRESSORS.

No. A 358 1 9 x 9 Clayton duplex.
No. A 195 1 4 1/2 x 6 Clayton.
No. A 118 2-12 x 16 air compressors.

HEATERS.

No. A 301 2 Smith Hill open heaters, 35 to 50 H.-P.
No. A 448 1 Bearman feed water heater, 24 in. diam., 8 ft. long.
No. A 447 1 Barragawanath feed water heater, 18 in. diam., 6 ft. 6 in. high.
No. A 211 1 Payne hot water or steam heater, 600 ft. radiation.
No. A 205 1 No. 3 Rice & Whitacre heater.
No. A 126 1 Stillwell-Bierce No. 4 heater.

HOISTING RIGS.

No. A 131 1 H.-P., 24 in. drum.
No. A 132 1 H.-P., 20 in. drum.
No. A 411 2 2 ton Reedy elevator hoists, 32 in. drum.
No. A 347 1 9 ton swinging crane, mast 14 ft. high.
No. A 432 2 "A" shaped house derricks, 40 ft. high.
No. A 438 1 "A" shaped house derrick, 30 ft. high.

WATER WHEELS.

No. A 157 2 36 in. turbine water wheels.
No. A 353 2 36 in. Backus water motors.
No. A 463 1 Tuerks 16 in. water motor.
No. A 464 3 Tuerks 8 in. water motors.

SHEARS.

No. A 330 1 double shear, with engine, cyl. 8 x 9, jaws 15 in.
No. A 331 1 double shear, with engine, cyl. 8 x 8, jaws 14 in.
No. A 327 1 hand power shear and punch. Will shear from 1/2 to 10 in. wide.
No. A 328 1 hand power shear. Will shear up to 8 gauge iron.
No. A 345 1 hand power or belt power punch and shear up to 3-16 iron.

COMBINED OUTFITS.

No. A 442 1 combined engine and boiler, each on separate base, 24 x 48 in. upright boiler, 4 1/2 x 5 upright engine.
No. A 329 1 hoisting rig, 2 separate engines, 2 hoisting drums attached to 36 in. x 6 ft. boiler, 5 x 12 upright engines.
No. A 323 6 x 7 Baxter engine and boiler.
No. A 294 8 x 9 Davey safety engine and boiler.
No. A 216 1 single drum 7 x 10 engine and 72 x 36 in. boiler.
No. A 212 1 portable 10 ft. x 28 in. fire box boiler and 5 x 12 engine.
No. A 209 1 8 ft. x 3 ft. 6 in. portable fire box boiler and 7 x 12 engine, with hoist drum and winches.
No. A 208 1 12 x 3 ft. portable fire box boiler and 6 x 12 engine.

MISCELLANEOUS.

No. A 172 1 double roller paint or ink grinder for power.
No. A 125 1 No. 1 Hubbard portable bake oven.
No. A 317 144 in. 1/2 in brass pipe.
No. A 417 24 in. cider or wine press.
No. A 429 1 passenger elevator car, 4 ft. 6 in. x 4 ft. 8 in. wide.
No. A 430 1 steel rotary car, 2 ft. 6 in. x 2 x 5 ft.
No. A 431 10 turnstiles from Omaha Exposition.
No. A 465 1 4 horse bunching sweeper and revolving broom.
No. A 418 14 in. Crane steam gate valve.
No. A 394 18 x 14 friction clutch pulley.
No. A 412 38 x 9 in. friction clutch pulley.
No. A 700 1 Buffalo jet condenser.

STEAM PUMPS.

We have a complete stock of all sizes and kinds. Write for list.

Our Catalogue No. 78 keeps you posted. We handle all kinds of supplies, such as Shafting, Hangers, Pulleys, Belting, Iron Roofing, Iron Pipe, Hardware, Rope Plumbing Material, &c. We are constantly buying entire stocks of general merchandise at sheriffs' and receivers' sales.

CHICAGO HOUSE WRECKING CO., West 35th and Iron Sts., Chicago.

FOR SALE.**SPECIAL ENGINES.**

- * 1 14 in. x 20 in. (Vertical) Slide Valve.
- * 1 14 in. x 30 in. Keystone Corliss (Brand new).
- * 1 11 in. and 19 in. x 24 in. Tandem Comp'd "Buckeye" (latest type) with condenser.
- * 1 22 in. x 42 in. Wetberill Corliss.
- * 1 28 in. x 48 in. Geo. H. Corliss make.
- * 1 24 in. x 36 in. Mackintosh, Hemphill & Co.
- * 1 36 in. x 60 in. Tangye Bed type.
- * 1 Crane Elevator Co. Modern Elevator Engine.

BOILER.

- * 1 Horizontal Tubular, 72 in. x 16 ft., with 84 3/4 in. tubes, approved for 100 lb. pressure, complete.

SHAFTS and PILLOW BLOCKS.

- * 15 Very fine forged Shafts, finished all over, 10 in. diam. to 16 in.

FLY WHEELS. For Balance and for Belts.**SMOKE STACK.**

- * Very fine steel self-supporting stack, 64 in. diam., 100 ft. high, with base casting, ornamental top and ladder.

HAMMERS.

- * 1 Hackney Cushion Hammer.
- * 1 1200 lb. Double Frame Steam Hammer.
- * 1 4 ton do.

SHEARS.

- * 1 New Alligator Shear with capacity up to 2 1/2 in. Cold Billets, or for Scrap cutting. Knives 14 in. long.

LOCOMOTIVES, New and Second-Hand.

- * Signifies Right-hand.
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German Nat. Bank Bldg. (6th and Wood),
PITTSBURG, PA.

Sales Agent for
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and all other Foundry Equipment, new and second-hand. Send us list of your wants.

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FOUNDRY FOR SALE OR RENT.

A modern Foundry completely supplied with up-to-date equipment, with a capacity of 12 to 17 tons daily, with a limit of 5 tons in one piece.

Best of light, and conveniences for high grade work, located in one of the best manufacturing centers in the Middle States.

The entire Foundry Equipment will be sold and the building leased for a term of years. Or the Equipment and building will be leased for a term of years at reasonable rates.

This is an unusual opportunity for parties to engage in Foundry business, as the Foundry has a good run of trade.

Parties desiring to manufacture a line of Hot Water or Steam Heaters, Radiators, or any line of work using castings, would find this an excellent opening, as much of the present trade could be retained if desired. Address in confidence,

"MODERN FOUNDRY,"

Care The Iron Age, New York.

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The old established retail hardware business and house furnishing goods of the late Samuel C. Redgrave, in Lyons, N. Y. For more than 60 years this house has borne the highest reputation. The sale will be made for the purpose of closing the estate. Value of stock about \$10,000. For particulars address

MRS. S. C. REDGRAVE,
Lyons, Wayne Co., N. Y.

FOR SALE.

Entire plant for manufacturing
WOVEN WIRE FENCING,
consisting of patent and looms for making railroad, farm, garden, hog fencing and poultry netting of a new style. Also raw and manufactured stock on hand if desired. Address

"WOVEN WIRE,"

care THE IRON AGE, New York.

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To represent manufacturers of Staple or Heavy Hardware, Iron or Steel, Nuts and Bolts, &c., &c. Either by carrying a stock in New York City, or by selling direct from factory. Located in the centre of the Hardware district, we have ample storage room, office and large sales room on GROUND floor. Address

CHAS. J. STEBBINS & CO.,
108 Reade Street, New York City.

BARGAINS.

- 1 No. 1 Brown & Sharpe Universal Milling Machine.
- 1 Semi-Universal Miller, Worcester Machine Co.
- 1 24 x 24 x 6 Gray Planer, new.
- 1 26 x 26 x 8 Planer.
- 1 18 x 18 x 5 Planer, with chuck.
- 1 16 in. D. T. G. Gould & Eberhardt Shaper.
- 1 12 in. Shaper, heavy machine, Michels.
- 1 36 in. heavy Bk. Gd. Drill, Massinet Mfg. Co.
- 1 30 in. Back Geared Drill Press and Chuck, Davis.
- 1 13 in. Sensitive Drill and Chuck, W. & R.
- 2 No. 2 Garvin Screw Machines.
- 1 Gray Screw Machine.
- 1 13 in. x 6 ft. bed, No. 6 Barnes Engine Lathe.
- 1 24 in. x 16 ft. Engine Lathe.
- 1 24 in. x 12 ft. " "
- 1 24 in. x 10 ft. " "
- 2 30 x 8 Engine Lathe, chain feed, \$30.00.
- 1 18 x 8 " " Michels.
- 1 16 x 6 " " Blaisdell.
- 1 15 x 6 " " Star Tool Co.
- 1 14 x 6 " " Pratt & Whitney.
- 1 Graves Hydraulic Elevator and Car, complete, capacity 3,000 lbs.
- 1 2 x 3 Gould Triplex Power Pump.
- 1 No. 0 Knowles Single Acting Steam Pump.

BARGAIN IN POWER PLANT.

- 1 100 H.-P. Sterns Tubular Boiler, complete, flush front, fitted with Hawley Down Draft.
- 1 70 H.-P. Phila. Corliss Engine.
- Above outfit complete with all valves, piping separator, heater and pan under fly wheel.
- All in fine condition, but little used.

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FOR SALE.

One Hundred Open Top Square Iron Tanks. Mounted on wheels. Capacity of each, 22 cubic feet, or 166 gallons. For blue prints and prices send to

M. P. COLEMAN,

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Manufacturing Site To Lease.

All or part of plot, 200 feet front on Railroad Street, near 25th Street, by about 880 feet in depth, also River Front, and having connections to both Allegheny Valley Railroad and Pittsburgh Junction Railroad. For long or short term.

W. J. CARLIN COMPANY,

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Foreman for Malleable Foundry Wanted.

Must be experienced as foreman, temperate and reliable; prefer man having money to invest in operation of business, plant to be furnished by us.

PORT HURON MFG. CO.,

Port Huron, Mich.

WANTED.

To purchase factory buildings suitable for manufacturing machinery. Plant having foundry preferred. Persons owning or knowing of plants now unused please address the undersigned. Should information prove valuable, party through whom brought to my notice will be paid for same.

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Foundry site with excellent water power at Medina, N. Y.

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Address "NASSAU,"

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ASSIGNEE'S SALE

OF

ROLLING MILL

AND

CUT NAIL FACTORY.

By virtue of a decree of the Court of Common Pleas of Centre county, there will be exposed to public sale at the Court House in the borough of Bellefonte, on

TUESDAY NOVEMBER 27, 1900.

At 2 o'clock P. M.,

All those several parcels or tracts of land, seven in number, specifically described in the deed from the Bellefonte Iron and Nail Company to the undersigned, as assignee, recorded in Miscellaneous Book "K," page 63, containing in the aggregate about twenty-two acres, fronting on Spring Creek and the Bald Eagle Valley Railroad, having a frontage of nearly half a mile on the latter, on which are erected a rolling mill, nail factory, warehouse and other buildings connected therewith. The capacity of the rolling mill is about fifty tons per day. There are fourteen puddling furnaces, three heating furnaces, rotary squeezer, fourteen inch train, extra rolls, etc. The nail factory contains fifty three nail machines, of which thirty are equipped with self-feeders, and has all the ordinary appliances and conveniences for the manufacture of cut nails. The property is in good condition and cost originally about \$180,000. It is within a few rods of the Central Railroad of Pennsylvania and can be easily connected therewith, giving an outlet either by the Pennsylvania system or by the Reading and New York Central systems east, west and north. The furnaces in the neighborhood furnish sufficient mill iron to keep the mill employed and the advantages in the saving of freight, etc., together with the low price of coal, constitute in themselves a fair profit over ordinary conditions.

TERMS OF SALE:—Ten per cent. in cash at time of sale; one half of the balance at the confirmation of the sale and the remainder in one year thereafter with interest, to be secured by bond and mortgage. Detailed information furnished by the undersigned.

THE COMMONWEALTH GUARANTEE, TRUST AND SAFE DEPOSIT COMPANY,

Harrisburg, Pa.

Assignee of the Bellefonte Iron and Nail Company.

Rd. Johnson, Clapham & Morris,
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Leading Iron Hardware and Furniture JOBBERS and IMPORTERS.

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Will be sold in lots to suit.

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All material in stock, and will be shipped immediately on receipt of order.

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Location near New York or represent such company in
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"WOVEN WIRE,"
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Equipment small **BOILER SHOP**, Rolls, Shears,
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Must have experience in Iron and Steel products
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WANTED.—SALESMAN of experience and established trade among hardware dealers and jobbers, machinery supply houses and factories, in New York City and vicinity; state age, experience and salary expected, with references. Address "Sales," care *The Iron Age*, New York.

WANTED.—An expert SHOP COST ACCOUNTANT to organize new system in foundry and machine shop; must come well recommended and have good record; state age and experience in application. Address "Gears," care *The Iron Age*, New York.

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SALESMEN.—A live Western concern manufacturing a line of hardware and implement specialties want three more hustlers on its staff; must be experienced specialty salesmen; time to be at work now. Address "Gem," care *The Iron Age*, New York.

WANTED.—A FOUNDRY FOREMAN to take entire charge of chilled roll foundry; also two chilled roll molders. Address, giving references and terms to "G. I. W.," care *The Iron Age*, 119 South Fourth street, Philadelphia, Pa.

WANTED.—FOREMAN for machine shop employing about 40 men; must be a thoroughly competent, experienced and capable man, familiar with drawings and capable of estimating machine work and directing work in shop; shop is well equipped and pleasantly located in a city of 50,000 in Eastern Ohio; line of work is principally contract and job work and a few specialties; state fully experience, age, salary expected and name past employers. Address Box 25, *The Iron Age*, Hamilton Building, Pittsburgh, Pa.

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WANTED.—A man capable of DESIGNING DIES for special forms to be forged in outdozer and under drop hammer, and capable of die sinking; to suitable party steady employment; give reference and state experience and wages expected. Address Box No. 782, Marietta, Ohio.

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Experienced SUPERINTENDENT for fan motor factory; must be expert mechanic and good handler of men; state experience, salary desired and give reference. Address "Eng. Fish Factory," care *The Iron Age*, New York.

Liberal inducements to **SALESMEN** to sell mechanical goods to dealers and manufacturers in New England, New Jersey, Maryland, Virginia and Delaware. Address "Liberal," care *The Iron Age*, New York.

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Undisplayed Advertisements for Situations Wanted not exceeding twenty-five words, including address. Fifty cents each insertion. Additional words two cents each.

An iron merchant and agent living near Birmingham, England, who has a good connection with users of pig iron, steel billets, blooms, tin plate, bars, &c., will be glad to take up sale in Great Britain for American makers. Apply Joseph Hammond, Stourbridge, England.

Experienced mechanical engineer on machine tools and general machinery and furnace work desires change as ASSISTANT ENGINEER, DRAFTSMAN or TRAVELING SALESMAN; technical education; location desired, New England or Middle States. Address "V. K. E.," care *The Iron Age*, New York.

N. Y. AGENCY WANTED.—Will represent concern manufacturing factory supplies or equipment; young man; been in the business; now employed. Address "R. D. W.," care *The Iron Age*, New York.

POSITION WANTED by first-class IRON and STEEL CHEMIST; best of references. Address "Chemist 1011," care *The Iron Age*, New York.

ENAMEL.—Party thoroughly experienced in manufacture of enamels of all kinds, enameled signs, stamped ware, cast iron sanitary and decorative ware, &c., desires charge of construction and operation of new works (can build plant from own designs), or correspond with firms for introduction of new, remunerative specialties in enameling. Address "Progress," care *The Iron Age*, New York.

WANTED.—Position with mechanical engineering company, with view of learning the business; some experience; age 21; home, Philadelphia. Address "W. R.," care *The Iron Age*, 117-119 South Fourth street, Philadelphia, Pa.

PACIFIC COAST.—Correspondence solicited with manufacturers wishing representation on the Pacific Coast; local and Eastern references. Address "S. I. B.," 429 Kearny street, San Francisco.

WANTED.—To represent manufacturer in Cleveland and Pittsburgh district; iron, steel or kindred lines; have acquaintance, experience and am located. Address 1430 Williamson Building, Cleveland, Ohio.

MACHINERY SALESMAN desires change; well balanced combination of engineering skill and commercial tact; can take charge of engineering department; up with the times; steel or wood construction, steam plants, power transmission, elevating and conveying machinery; want responsibility. Address "Versatile," care *The Iron Age*, New York.

An industrious **ROLL TURNER** is open for a situation; a capable, sober and energetic man. Address "Roll Turner," care *The Iron Age*, Hamilton Building, Pittsburgh, Pa.

CHEMIST and **ASSAYER**, technically educated, experienced in analysis and accustomed to the supervision of manufacturing operations, desires position where attention to business will be appreciated; references A1. Address "Analytical," care *The Iron Age*, New York.

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Competent young man, 25 years, thoroughly experienced in all branches of hardware business, desires to change present position for one with larger opportunities and greater prospect of advancement; has been connected with the business for ten years, and would prefer selling goods for manufacturers or jobber in Philadelphia or other vicinity. "Hardware," care *The Iron Age*, 119 South Fourth street, Philadelphia, Pa.

Position by experienced **GALVANIZER** and **TINNER**, competent to take charge or erect new plants; drawings furnished; best of references. Address "Galvanizer," care *The Iron Age*, New York.

Experienced engineer, 33 years old, college graduate, desires **SELLING AGENCY** or position as **LOCAL AGENT** in New York City for manufacturing concern of high standing; compensation in salary or commissions; highest references. Address "Agent," care *The Iron Age*, New York.

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Wanted, by an energetic and capable young business man of 15 years' experience, a first-class and staple line to handle on salary or commission basis for first-class concern in exclusive territory (Chicago and near-by points); first-class references. Address H. L. Gordan, care *The Iron Age*, 1205 Fisher Building, Chicago, Ill.

CHEMIST.—Practical blast furnace and steel works chemist; understands burdening of blast furnace; experienced in Northern and Southern iron ores; desires a situation where he can assist superintendent or furnace manager. Address "P. B. F.," care *The Iron Age*, New York.

A member of Inst. of C. E. of Belgium, who has had for the last 15 years in London a large and practical experience in the engineering and iron trades, offers his services to American firms for the sale of their materials to any part of Europe. Address E. Cloes, C. E., Oreye, Belgium.

Help Wanted.

Undisplayed Advertisements for Help Wanted not exceeding fifty words, including address. One Dollar each insertion. Additional words two cents each.

Original letters of reference should not be inclosed with replies to advertisements appearing in these columns, as they are frequently mislaid and lost. A copy of the reference will serve the purpose.

WANTED.—SUPERINTENDENT for iron ore mines in Pennsylvania; must be thoroughly competent; give experience and references and state terms; property not much developed at present. "Ore Mines," care *The Iron Age*, 119 South Fourth street, Philadelphia, Pa.

Wanted for a large Siemens steel works in Scotland, a thoroughly up to date open hearth Siemens basic SUPERINTENDENT; state age, experience and wages wanted; traveling expenses paid and steady employment given to suitable man. "Scotland," care *The Iron Age*, New York.

SALESMEN for Iowa, Indiana and Illinois to sell a complete line of coal and wood ranges and heaters, gas, gasoline and oil stoves, ovens and sheet iron goods for a large manufacturing company; none but first-class, capable men, thoroughly conversant with the above lines, need apply. Address "1901," care *The Iron Age*, New York.

WANTED.—An ASSISTANT SUPERINTENDENT of a large foundry and machine shop; applicant must be active young man of experience, highest character and familiar with modern methods; lucrative position with good prospects for right man. Address "Ability, 111," care *The Iron Age*, New York.

WANTED.—SALESMAN of experience and established trade among hardware dealers and jobbers, machinery supply houses and factories, in New York City and vicinity; state age, experience and salary expected, with references. Address "Sales," care *The Iron Age*, New York.

WANTED.—An expert SHOP COST ACCOUNTANT to organize new system in foundry and machine shop; must come well recommended and have good record; state age and experience in application. Address "Gears," care *The Iron Age*, New York.

WANTED.—Middle aged man of prepossessing appearance to travel in the New England, Eastern and Middle Western States with a specialty; a good chance for one who is capable to handle the manufacturing trade and can figure on jobs for small gray iron castings as well; references must accompany application to receive proper consideration; only those having experience in foundry line need apply. Address "F., 111," care *The Iron Age*, New York.

SALESMEN.—A live Western concern manufacturing a line of hardware and implement specialties want three more hustlers on its staff; must be experienced specialty salesmen; time to be at work now. Address "Gem," care *The Iron Age*, New York.

WANTED.—A FOUNDRY FOREMAN to take entire charge of chilled roll foundry; also two chilled roll molders. Address, giving references and terms to "G. I. W.," care *The Iron Age*, 119 South Fourth street, Philadelphia, Pa.

WANTED.—FOREMAN for machine shop employing about 40 men; must be a thoroughly competent, experienced and capable man, familiar with drawings and capable of estimating machine work and directing work in shop; shop is well equipped and pleasantly located in a city of 50,000 in Eastern Ohio; line of work is principally contract and job work and a few specialties; state fully experience, age, salary expected and name past employers. Address Box 25, *The Iron Age*, Hamilton Building, Pittsburgh, Pa.

MECHANICAL DRAFTSMAN of some experience; excellent chance for advancement; technical graduate preferred. Address, giving full particulars, "Transmission," care *The Iron Age*, New York.

WANTED.—A practical rolling mill man, one thoroughly competent to operate an 18-inch plate mill; state nationality, previous experience, age, salary wanted and other information to the point. Address "E. W. P.," care *The Iron Age*, New York.

TRAVELING SALESMEN for every State and Territory in the Union to sell a new article as a side line to hardware and house furnishing goods trade; good commission. Address Box 298, Dubuque, Iowa.

WANTED.—FOREMAN for pattern shop in the vicinity of Boston, Mass.; one competent to take charge and familiar with stair and housework. Address, giving age, experience and wages expected, "Pattern," care *The Iron Age*, 70 Kilby street, Boston, Mass.

Experienced **HARDWARE** or **CUTLERY SALESMEN** who thoroughly canvass one or two of the following States: Pennsylvania, Michigan, Indiana, Illinois, Kentucky, Missouri, Kansas, Colorado, Montana and coast to take a side line of miscellaneous cutlery, butcher, putty and kitchen knives, &c. Address "Big Cut," care *The Iron Age*, New York.

WANTED.—Thoroughly competent foundryman as GENERAL SUPERINTENDENT of large jobbing foundry; must be familiar with pattern work, fitting and modern foundry practice; state experience, reference and salary desired; position to be filled on or before January 1, 1901. Address "Fuller," care *The Iron Age*, New York.

Wanted, competent and experienced SUPERINTENDENT for a bolt and nut factory; state nationality, previous experience, age, salary wanted and other information to the point. "Bolt Manufacturer," care *The Iron Age*, New York.

WANTED.—A man capable of DESIGNING DIES for special forms to be forged in outdoser and under drop hammer, and capable of die sinking; to suitable party steady employment; give reference and state experience and wages expected. Address Box No. 782, Marietta, Ohio.

WANTED.—First-class PATTERN MAKERS, both wood and metal. Apply at once. Acme Harvester Company, Pekin, Ill.

Experienced SUPERINTENDENT for fan motor factory; must be expert mechanic and good handler of men; state experience, salary desired and give reference. Address "Eng. Fish Factory," care *The Iron Age*, New York.

Liberal inducements to **SALESMEN** to sell mechanical goods to dealers and manufacturers in New England, New Jersey, Maryland, Virginia and Delaware. Address "Liberal," care *The Iron Age*, New York.

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Undisplayed Advertisements for Situations Wanted not exceeding twenty-five words, including address. Fifty cents each insertion. Additional words two cents each.

An iron merchant and agent living near Birmingham, England, who has a good connection with users of pig iron, steel billets, blooms, tin plate, bars, &c., will be glad to take up sale in Great Britain for American makers. Apply Joseph Hammond, Stourbridge, England.

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N. Y. AGENCY WANTED.—Will represent concern manufacturing factory supplies or equipment; young man; been in the business; now employed. Address "R. D. W.," care *The Iron Age*, New York.

POSITION WANTED by first-class IRON and STEEL CHEMIST; best of references. Address "Chemist 1011," care *The Iron Age*, New York.

ENAMEL.—Party thoroughly experienced in manufacture of enamels of all kinds, enameled signs, stamped ware, cast iron sanitary and decorative ware, &c., desires charge of construction and operation of new works (can build plant from own designs), or correspond with firms for introduction of new, remunerative specialties in enameling. Address "Progress," care *The Iron Age*, New York.

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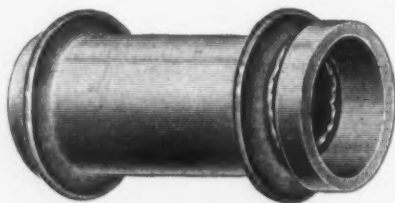
A member of Inst. of C. E. of Belgium, who has had for the last 15 years in London a large and practical experience in the engineering and iron trades, offers his services to American firms for the sale of their materials to any part of Europe. Address E. Cloes, C. E., Oreye, Belgium.



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WELD WHICH MUST INTEREST YOU.



Barrel Wire Hoops,
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It makes no difference how large or small a property is, we guarantee an exact appraisal.

What is your plant worth in detail at present market prices?

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These questions are vitally important to all owners, stockholders or investors. The American Appraisal Co. can answer them.

We furnish complete and accurate invoices, inventories, and plans of manufacturing plants, mills and all properties, guaranteeing absolute proof of loss in case of fire and correct data for carrying insurance. Invaluable in securing loans. We can refer you to the following and many others: Bridgeport Brass Co., Bridgeport, Conn.; Fairbanks, Morse & Co., Chicago, Ill.; Vaughn Machine Co., Peabody, Mass.; Ansonia Clock Co., Brooklyn, N. Y., and many others. We will call upon you or write you. Send for our book of particulars.

THE AMERICAN APPRAISAL CO.

OF MILWAUKEE,

Capital Stock \$100,000.

Eastern Department,

804-805 Park Row Bldg., New York.

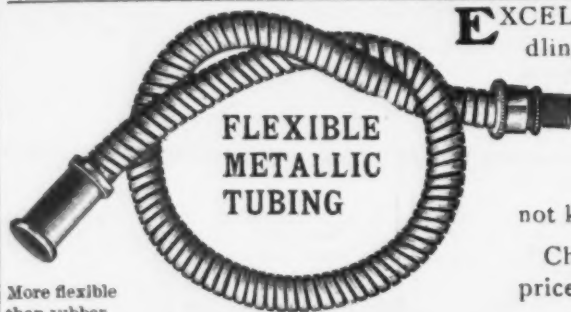
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Inter-
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Process
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Casting
which
Avoids
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Work.

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than rubber
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EXCELS rubber hose for handling steam, compressed air, water, gas, oil, spirits and all other uses.

Made from copper and steel tape. Will not kink or crush.

Cheap, durable, safe. For prices, etc., address

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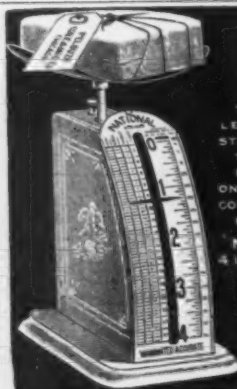
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MACHINE WORK, TINNING, GALVANIZING AND JAPANING.
For prompt estimates, send samples and state quantity wanted.

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SHEET METAL

of every description.
Send samples or drawings for estimates.

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BICYCLE FITTINGS, FERRULES, FLOOR and CEILING PLATES, Etc. STAMPINGS

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Dies, Punches,
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Send sample or
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E. KONIGSLOW & BRO.,
110 SENECA ST.,
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We do

Special Stamping,

Light or heavy, rough or finished.
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Sheet metal articles of any kind. Press work. Inventors' sheet metal models. Difficult work our specialty. Write us.

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New and strictly up-to-date equipment, prompt delivery and low prices.
Send sample or drawing for estimate.

FRANK MOSSBERG CO., Attleboro, Mass.
Mfrs. Sheet Metal Novelties and Special Tools and Mach'y.

DIES, PUNCHES, SPECIAL MACHINERY and TOOLS. SHEET STAMPINGS. METAL

Don't think because we are in the West we can't do it, but send sample or sketch for prices.

AMERICAN HARDWARE MFG. CO., OTTAWA, ILLS.

PATTERNS THE BALKWILL PATTERN WORKS, 970-972 Hamilton St., CLEVELAND, O. WE MAKE A SPECIALTY OF RUSH WORK.



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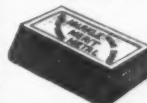
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FINEST QUALITY
Designed for High Speed Machinery and also for Heavy Bearings where the BEST quality is wanted.
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HIGH GRADE.
Suitable for Heavy or Light Machinery. For general use the best Babbitt Metal on the market. We guarantee this metal to give satisfaction wherever used.
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A First-class Anti-Friction Metal for general use. Will compare favorably with the best anti-friction metals on the market.
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A complete line of medium and cheap Babbitt Metal and all grades of "OLDIE".
Special Metals Matched, and All Kinds of Alloys Made to order.
Full satisfaction guaranteed or money refunded.

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Makers of Shot, Babbitt Metal, Solder, Bar Lead, Can Wax, Targets and Traps. AGENTS WANTED.

PRESSED METAL WORK. Light and Heavy Plates Cut to Shape.

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BUY THE BEST. "ECLIPSE" and "ST. LOUIS" Shoe Stands and Lasts, Shoe Hammers, Foot Rests, Saw Clamps.



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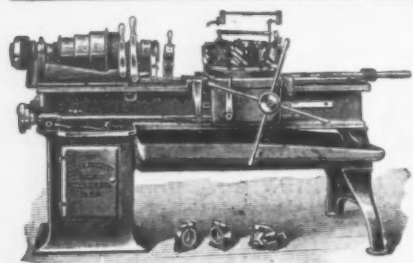
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Does lathe work accurately
up to 2 in. diameter
by 24 in. long.

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COMPANY,**

SUCCESSORS TO

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MANUFACTURERS OF

THE TYLER Double Crimped
Wire Cloth

FOR STAMP BATTERIES.

Steel, Tin, Brass and Copper Cloth for Coal and Ore
Screens, Flour Mills, Paper Mills and Maltsters
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Send for illustrated catalogue.

Cahall Sales Department, Pittsburg, Pa

"AMERICAN" TRANSMISSION ROPE.

SEE ADVERTISEMENT
PAGE 6.

ALUMINUM

Ingot, Sheets, Wire, Rods, Castings.
Aluminum Wire and Cables (bare and insulated)
FOR
ELECTRICAL CONDUCTORS.
The Pittsburgh Reduction Co.,
Pittsburgh, Pa.

H. C. FRICK COKE CO.

Post Office, PITTSBURG, PA.

Mines and Ovens in the Connellsville Coke Region, Penna.

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FRICK COKE

GENUINE CONNELLVILLE COKE

For Blast Furnaces and Foundry
Cupola Work; also Crushed Con-
nellsville Coke (substitute for An-
thracite Coal) for manufacturing
and domestic purposes.

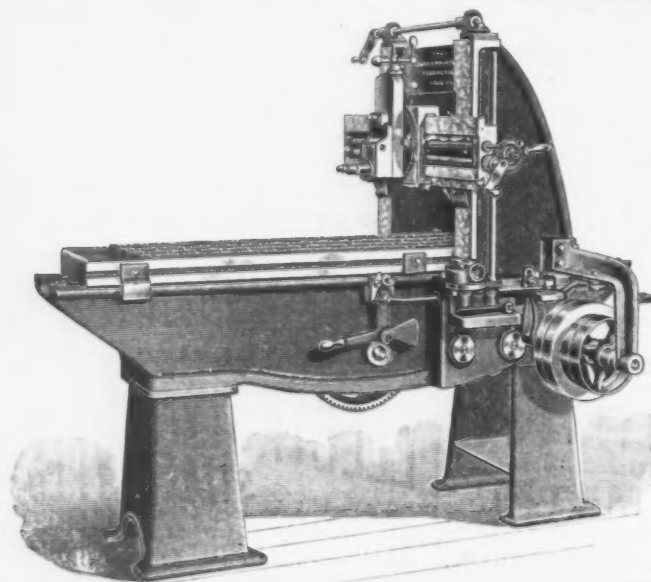
13,500 Ovens.

Daily capacity, 30,000 tons of Coke

Direct Connections with all Railroads Entering the Region.
Quotations, Freight Rates, Pamphlets giving full information, promptly fur-
nished upon application.

16" x 16" x 4' Tool Room Planer.

We have recently re-designed our 16" x 16" x 4' planer in several important particulars with a view of presenting a machine that would meet the requirements of the most exacting of mechanics. No expense or pains have been spared to make this a machine that will plane perfectly true in every particular; each and every machine being brought to the degree of precision before it leaves our works.



It has a new departure in the way of feed mechanism. Very little power is required to drive this planer, as its feed mechanism is *frictionless*, and offers no resistance to the pull of the belts. Down feed is graduated to thousandths. This planer is finished in the same degree of excellence that is found on Hendey-Norton lathes and shapers. Net weight, 2,560 lbs. Send for catalogue

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Machinery Co., Pittsburg; The E. A. Kinsey Co., Cincinnati; Manning,
Maxwell & Moore, Chicago; Pacific Tool & Supply Co., San Francisco.

EUROPEAN AGENTS:

Schuchardt & Schutte, Berlin, Vienna, Brussels, Stockholm, St.
Petersburg; Chas. Churchill & Co., Ltd., London, Birmingham.
Adphe. Janssens, Paris. Stussi & Swaefel, Milan, Italy.

THE IRON AGE

THURSDAY, NOVEMBER 1, 1900

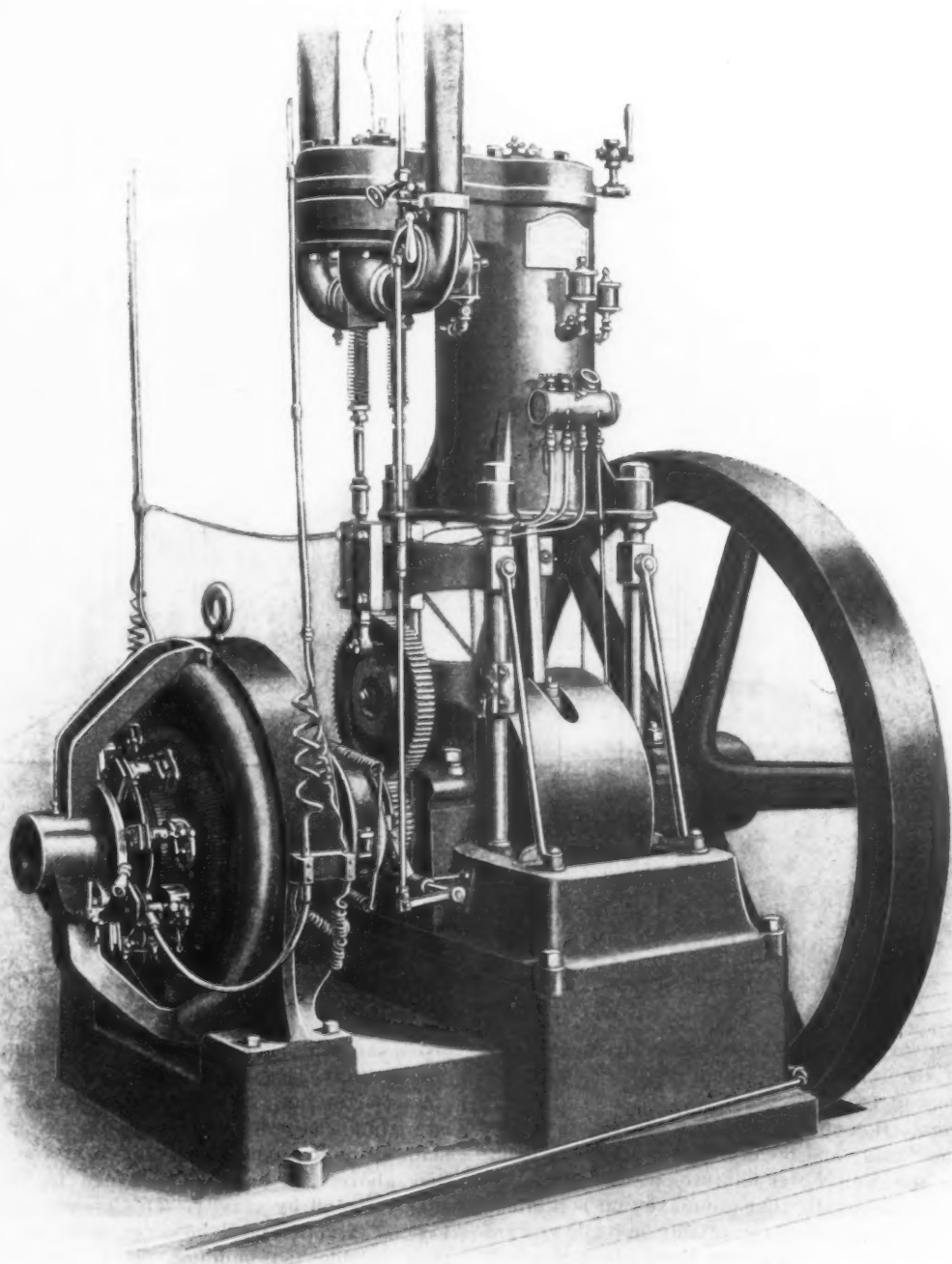
The Secor Internal Combustion Engine.

The accompanying drawings illustrate a single cylinder kerosene oil engine directly connected to a generator, all being mounted on a common base. With this simple plant an electric current can be developed under a full

load with a variation not exceeding one-half volt. In this engine vibration is suppressed by balancing all stresses caused by the expansion of the gases within the cylinder, as well as those stresses caused by the kinetic change from reciprocating to rotary movement and the stresses due to centrifugal effect. It is claimed for this engine, which is built by the General Power Company,

100 William street, New York, that it will automatically utilize the oil with chemically correct or colorless combustion, is absolutely reliable in operation, and as sensitive in responding to load changes as a well governed steam engine.

In describing the operation of the engine it may be



THE SECOR INTERNAL COMBUSTION ENGINE.

load with a variation not exceeding one-half volt. In this engine vibration is suppressed by balancing all stresses caused by the expansion of the gases within the cylinder, as well as those stresses caused by the kinetic change from reciprocating to rotary movement and the stresses due to centrifugal effect. It is claimed for this engine, which is built by the General Power Company,

remarked that the cylinder, unlike that of a steam engine, is considerably longer than the piston stroke, so that the piston at its full up stroke leaves a considerable space into which it does not enter. This open space, together with the space within the valve chamber, constitutes the combustion chamber of the engine, Fig. 4. It will be noticed that two poppet valves open inwardly

into the valve chamber; the outer valve is the inlet or feed valve, through which the air and fuel enter; the inner and larger valve is the exhaust valve, from which the working fluid is discharged or rejected on the return or exhaust stroke of the piston. These valves are actuated by a cam driven by gearing from the main shaft, Fig. 1, the engine shaft making two revolutions for each revolution of the cam gear. The single cylinder serves alternately the purposes of motor and pump; during the first working stroke downward the inlet valve is held open in order that air and oil may enter simultaneously. This charging stroke is the first in the cycle of operations. The oil entering by the oil inlet, as shown in Fig. 5, is atomized by the air crossing it at right angles in the oil and air inlet. The return stroke then compresses the uniform mixture into the combustion chamber, Fig. 4, and when the piston is full stroke upward the pressure

as in the larger sizes, is connected to the air controlling valve, shown in Fig. 5, by means of bell cranks and a vertical connecting rod. A decrease in load causes the rod to rise, thus reducing the air supply; a small connecting rod unites the air controlling valve with the oil needle valve, as shown on the drawing. The oil supply is thus reduced with the air supply, the object being to furnish a reduced supply of each while the mixture remains of uniform constitution. The governor thus measures out a charge proportioned to the exact load on the engine. It is absolutely essential that the mixture shall at all times be perfectly homogeneous and of chemically correct proportions. The adverse influence of changes in temperature and humidity of the atmosphere on the proper and economical operation has been corrected in the type of engine illustrated. It is also essential that the timing of the ignition with respect to the position of the

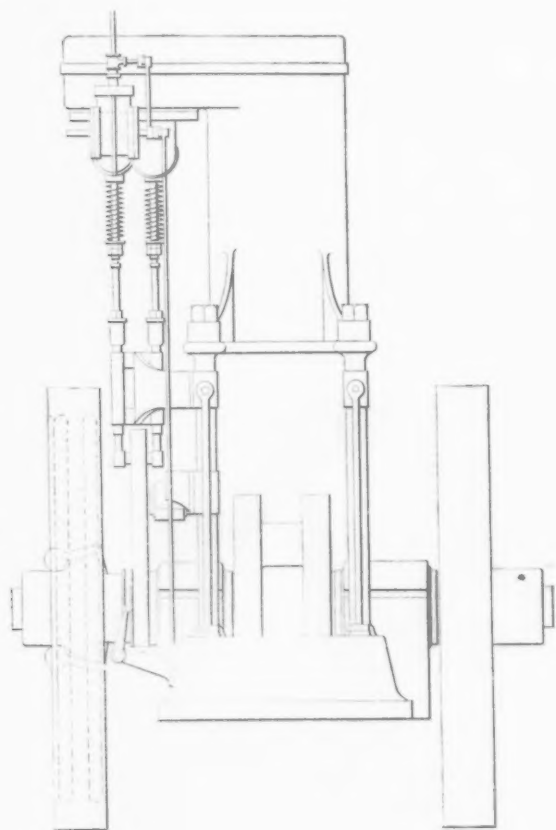


Fig. 2. Front Elevation.

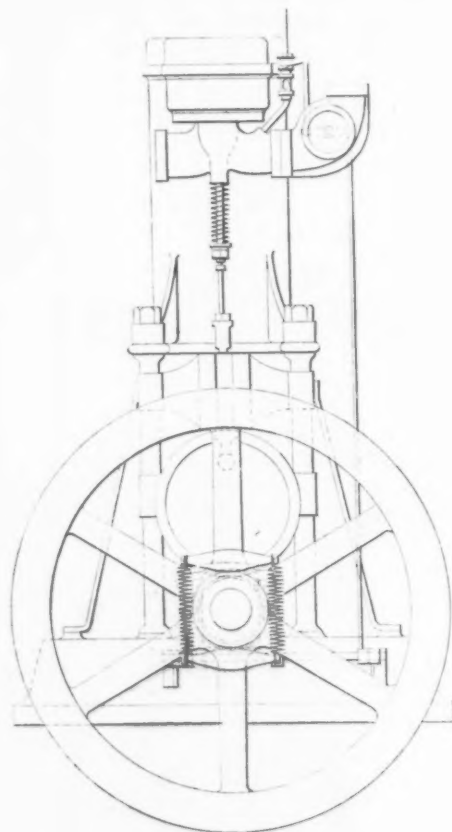


Fig. 3.—End Elevation.

THE SECOR INTERNAL COMBUSTION ENGINE.

has increased to an amount determined by the relative capacity of the space. This compression stroke is the second stroke in the cycle.

At the completion of this stroke an electric spark produced by the "make and break" electrodes of the firing plug ignites the compressed mixture, which causes the pressure to rise so rapidly that the maximum is attained before the piston has moved appreciably on its downward stroke. The piston is thus under the highest pressure at the beginning of its stroke and the whole stroke is available for expansion. This working stroke is the third in the cycle. Just before the motive stroke downward is completed the exhaust valve commences to open, so that it is nearly wide open at the commencement of the next up stroke. This fourth stroke discharges the products of combustion, completes the cycle of operations and leaves the piston in position to renew the cycle.

The regulation of speed is accomplished by varying the power of the working impulses to suit the variations of working load. A centrifugal governor placed on the hub of the fly wheel, or on an independent vertical shaft,

piston should be such as to give the maximum mechanical effect with the least vibration. This necessitates a varying point of ignition. The engines are always started under late ignition in order to avoid premature impulses. The main oil tank is sometimes carried at a sufficient elevation above the point of delivery to the engine to supply the oil by gravity. This system is illustrated in Fig. 5. A better plan, however, is to provide a supply tank outside the building, below the surface of the ground and incased in cement in such a manner as to fully protect it from heat in case the building should burn. One refinement provides the engine with a pump which supplies the oil to a glass cup attached to the cylinder, having its bottom on a level with the needle valve through which the oil is admitted to the combustion chamber. The oil feed is independent of the engine itself and does not require the use of a carburetor or any form of external gasifier.

While this engine is primarily designed to use kerosene oil, it is also adapted to use gas, and is readily provided with connections and valves for both oil and gas

in such a manner as to use either oil or gas alternately. The governor is attached to a vertical governor shaft, as before mentioned; the object of this is to bring the governor closer to the throttle and thus permit lighter and closer connections. On certain types spiral gears as well as valve cams just below the valve chamber actuate the governor.

The exhaust pressure in single action engines is at times as high as 35 pounds to the inch. The addition of a larger central cylinder working on the compound principle permits this pressure to be utilized for power. Every down stroke of the low pressure cylinder is an impulse stroke. With three cylinders it is possible to obtain the effect of four single acting cylinders while using only the fuel required for the two outer cylinders. The extreme compactness and lightness of this combination, as well as the economy, will be evident to any one familiar with the compound steam engine.

In the engine designed for use on automobiles the cylinder is horizontal, open at both ends and contains two independent pistons. The explosion space is contained between these pistons, and the working impulse operates each piston equally in an outward direction. Inasmuch as it is impossible to supply a firm foundation to a carriage motor, it became necessary to devise a me-

furnace. Of course, costs of making pig iron at that time were very much lower than they are now.

The Chicago Labor Troubles Ending.—An important step was taken on the evening of the 24th ult., in the settlement of the labor troubles in the Chicago building trades. The union of bridge and structural iron workers formally withdrew from the Building Trades Council, the resolution in favor of withdrawal passing by a large majority. This action was taken in connection with the agreement recently entered into between the union and the Iron League. The effect of the action of this union was seen on the following day in the vigorous resumption of work on the Post Office Building which had been progressing very languidly for a long time. The Journeymen Plumbers' Union took the same action a short time previously, and other unions are expected to follow the same course. Thus one by one the different unions are settling their disagreement with the contractors, so that building operations can be resumed in Chi-

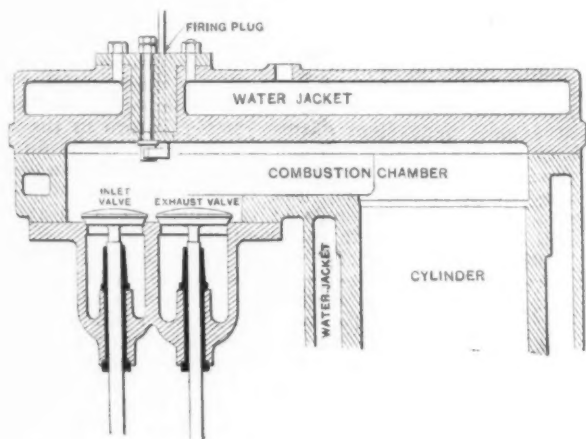


Fig. 4.—Section Showing Valve Arrangement.

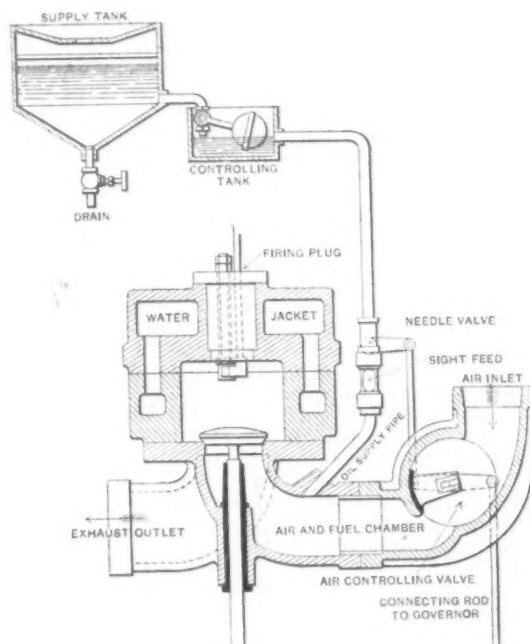


Fig. 5.—Section at Right Angles to Fig. 4, Showing Oil Feed and Governing Mechanism.

THE SECOR INTERNAL COMBUSTION ENGINE.

chanical arrangement which would absolutely eliminate the recoil of shock incident alike to the cannon and the reciprocating engine, caused by unbalanced pressure. So far as a cannon is concerned, if the bore were continuous from end to end, and the charge placed between two cannon balls of equal dimensions and weight, each equally free to move in opposite directions, the recoil of the gun itself would be nil. The problem of exactly balancing the stresses of a reciprocating engine is more difficult, however, by reason of the change from pressure on the piston to torque on the shaft.

The new Wooten engines which are to haul passenger trains from Youngstown to Cleveland on the Erie Railroad are attracting considerable attention on account of their size. The drivers are 76 inches in diameter, the cylinders are 13 and 22 inches in diameter, with a 26-inch stroke. The fire box heating surface covers 162 square feet, and the tubes an additional 2168 square feet. The grate area is 64 square feet. The tender capacity is 6000 gallons of water and 12 tons of coal. The weight of the locomotive on the drivers is 84,200 pounds, while the total weight without tender is 151,000 pounds. The total weight with loaded tender is 267,800 pounds, or 134 tons.

While Bessemer pig iron is being quoted in the Pittsburgh district at \$13.25 to \$13.50 per ton, and sales have recently been made at lower prices, it is a fact that in July and August, 1897, sales were made at \$9 a ton at furnace in the Mahoning and Shenango valleys, and in some cases sales were made at slightly less than \$9 at

cago as speedily as contracts are made with owners. So little building has been done in the city of Chicago this year that it is reasonably expected that this winter and next spring will see a very great degree of activity. It has been most unfortunate that the difficulty continued so long, as it had a depressing effect on many branches of local business.

The formation of an auxiliary company to the Pittsburgh Coal Company, for the purpose of taking control of all lands now held by the concern as well as to get control of more coal lands in the Pittsburgh district, is being considered. Since the organization of the Pittsburgh Coal Company, many independent operators have been busily engaged in collecting mining rights all over the Pittsburgh coal territory. More recently, it is said, foreign capital has been quietly gathering up available coal lands that were not taken up either by the combines or by the independent operators. The Pittsburgh Coal Company have now about 45,000 acres of coal land under their control. At a meeting of the directors recently it was suggested that in view of the prevailing conditions it would be wise for the company to fortify themselves for the future by reaching out for all available coal lands that they can get in addition to their present holdings and hold them through a special land company. The new company are expected to be composed of men interested in the company. They will secure more lands and control those now held by the combine by the issuance of a debenture bond covered by the royalties now paid by the company, and which amount to about \$750,000 a year. Nothing has been done as yet toward the formation of the new company, but they are expected to be organized within a short time.

Abram S. Hewitt on Trusts.

Under date of October 24 Hon. Abram S. Hewitt has addressed the following letter to Marcus Schnitzer, editor of the *Austro-Hungarian Gazette* of New York:

You ask me to supplement my previous letter to you by the expression of some opinion on the question of trusts, which, since your original letter to me, has assumed considerable prominence in the speeches made both by Democratic and Republican speakers. I have heretofore made no answer to your request, because I desired to see the precise position which Mr. Bryan would finally take upon the subject. He dealt with it extensively in his remarks at the Madison Square Garden, and he has made frequent references to the subject in his itinerary speeches delivered since he left New York. His utterances clearly show that he does not understand the nature of the question which he discusses with many words, but with few ideas. His arguments, if they may be so termed, can be summed up in the brief statement that he does not believe in the principle and right of association, upon which is based the extraordinary industrial progress of the present age. In order to show how shallow he is, it is only necessary to restate a few fundamental principles of social science.

1. Every man has a right to work or to refrain from work. If he works, he is entitled to the fruits of his labor. In other words, private property is the logical and inevitable result of individual liberty.

2. The right of men to associate with each other for any lawful purpose is indispensable to social progress. This right carries with it the same security for associated capital as belongs to individual property.

3. The association of men together may be either by partnership or by what is known as corporate organizations. In these organizations society has not yet limited, and probably cannot limit, the amount of capital which may be thus associated for industrial enterprises. In popular parlance, a large amount of capital thus associated under a corporate charter is called a "trust," although the original significance of the word was very different. Bryan uses the word, however, in its present popular sense, and in this letter I will accept his definition.

In attacking trusts, therefore, he attacks the principle of the association of capital. But associated capital cannot be attacked without assailing the correlative right of association on the part of those who depend upon their daily labor for their support. This right of association on the part of labor is one which the workmen of this country have strenuously asserted under very great opposition, and which they will never yield and never can yield without the loss of all that they have gained through years of struggle for increased wages and greater comfort. It amazes me, therefore, that Bryan should in his speeches attack the right of association, which is absolutely indispensable to the welfare of the working classes. He does not seem to be aware that in his efforts to set class against class he is attempting to destroy the very principle upon which the hopes of the workmen of this country for future betterment must be founded.

Every trades union is, according to Mr. Bryan's definition, a trust equally with the association of capital for the purposes of production or distribution. The principle which underlies both is precisely the same, and neither one can be surrendered without relegating society to an intolerable condition of confusion, of stagnation, and of warfare between the several classes of which it is constituted. How Mr. Bryan can expect to get the votes of the workmen of this country in favor of the destruction of the very principle of association upon which their welfare depends passes my comprehension.

This view of the subject goes to the bottom of the question, but when Bryan comes to discuss it in detail he shows great ignorance, both of the existing law and of the possibilities of remedying the evils of which he speaks. His remedies are, first, that all corporations largely engaged in business shall receive a license from the Federal Government before they shall be permitted to engage in interstate commerce. He does not seem to know that the Federal Government has no power to grant such licenses, and under the Constitution, as it stands, cannot exercise it. If he had proposed an amendment of the Constitution of the United States, by which the power to create corporations should be taken from the States and conferred upon the Government, the suggestion would have been statesmanlike and many profound thinkers would probably agree with him. My own inclination is certainly in that direction, although I see that Secretary Root takes an opposite, and, I believe, a mistaken, view.

His next remedy is to repeal the tariff duties upon any article which is produced and sold by corporations called "trusts." He does not seem to know that this remedy

would affect hundreds of individual producers who are entirely free from any connection with "trusts" or with monopolies of any kind. In other words, he will ruin hundreds of innocent persons for the sake of punishing a single offending corporation.

His third remedy is to prevent corporations from doing business if they have a monopoly of the production of any article of trade. I confess I know of no such corporations, except those which are protected by the patent laws of the United States. Doubtless he had in mind the Standard Oil Company and the Sugar Trust. If so, he was very unfortunate in the selection of his object lessons. Neither of these companies has any legal monopoly, but they control very large amounts of capital and employ many thousands of workmen. They have both cheapened the cost of primary articles of necessity and their monopoly consists in their ability to produce these articles at a lower cost than their competitors.

I know of no greater benefaction to the community than cheap light, and certainly the Standard Oil Company have accomplished the miracle of illuminating the entire country at a merely nominal cost. They make great profits because they have distanced all competitors in applying labor saving processes in the production of oil. Moreover, they have certainly preserved to the United States one of the leading lines of export, which has contributed largely to turning the balance of trade in our favor and to the unprecedented prosperity of the last two years. The destruction of the Standard Oil Company, so far as I can judge, would simply raise the cost of light and cut down the exports which are now maintained by reason of the great capital of that company and its use in the foreign markets of the world.

As to the Sugar Trust, there is not even the pretext that there is any monopoly. They have now very powerful competitors, and the growth of the beet sugar industry is going on at a pace which promises soon to make us entirely independent of cane sugar. Nevertheless, if the Sugar Trust has had a monopoly, it has been of a most benevolent nature. Never before in the history of this country has sugar been so cheap as during the last five years. The business is now carried on under very great competition, and there is not the slightest prospect that a monopoly of the kind Bryan speaks of will ever be created in this country.

Bryan's next remedy is to squeeze the water out of the capital stock of corporations. If he should succeed in squeezing all the water out of the capital stock of these corporations, he would produce a deluge which would overwhelm the industries of the country and leave a track of desolation at which even his optimistic soul would be appalled. Doubtless, with his versatile confidence in his ability to work miracles, he would attempt to re-enact the fabled role of Deucalion, but his efforts would fail to restore the ruined industries of the land.

The fact is that the water in the stocks of industrial corporations is not only innocuous, but from one point of view is positively advantageous. The modern corporation is usually organized on the basis of preferred stock, representing the fair money cost of the property, and of common stock, representing the good will and the possibility of profit which may be realized out of the business. The common stock, therefore, has cost no money, and it sells in the market at a price which has some relation either to the actual or possible profits after paying a fixed rate of dividend upon the preferred stock, which represents actual investment of money. In this common stock, to my mind, lies the chief hope of the workman of this country in the future. When times are prosperous it will undoubtedly bring a high price. When times are adverse the stock will fall to a nominal value. It does, however, control at both times the administration of the business. My expectation is that when it is cheap the workmen will buy it up, and in the course of the coming century I expect to see most of the large industrial corporations controlled by the workmen, who have thus secured the ownership of the common stock at a low price and under favorable circumstances.

When this era is reached, the preferred stock will be in the nature of a loan, on which no dividends will be paid unless the business earns them. In other words, the preferred stock will represent capital, and not debt, and this capital will be at the risk of the business. Common stock, on the other hand, will represent the control of the property, and will very properly find itself in the hands of the executive officers and of the workmen, who actually conduct the business. When times are good the workmen will thus share in the prosperity. When times are bad the capitalist will have to go without his dividends upon the preferred stock. There will be no conflict between capital and labor when this beneficent system shall have developed into the general ownership which I expect to see, as soon as the working classes of this country are sufficiently educated to take advantage of this new and favorable situation.

I am somewhat surprised that so intelligent a man as Mr. Mitchell has shown himself to be has not already

and the funds at his command to secure the control of one of the great coal companies, some of which are organized on the basis of preferred and common stock as above described. I have no doubt that he will sooner or later adopt this policy, and he and his associates will then be able to understand what the difficulties are in conducting large mining operations, and if they be as profitable as he thinks, they will be able to secure these profits for the members of the trades unions which he represents with so much ability.

If I am right in these views, it is evident that the nostrums proposed by Mr. Bryan for the regulation of trusts are quack remedies. They are not founded upon knowledge, but spring from an entire misconception of the nature of the problem and of the trend of modern progress. The great corporations which have sprung into existence within the last ten years are due to an evolution which no more can be arrested than the flow of the tides. They are not injurious to the community or to the working classes. They give more steady employment and a greater demand for labor. The wages have been raised, and the prices of the commodities produced here have been lessened. All classes of the community have been benefited by their growth, except such as have been disabled for a time, only to reappear in the form of consolidated organizations more profitable and more advantageous to the community.

It does not follow from what I have said that these great corporations do not need regulation. They have developed evils, which can readily be corrected by proper legislation, but the organizations themselves cannot be abolished without injury to the growing interests of the American people. The limits of this letter do not admit of going into any detail as to the legislation required, but in a general way it may be said that the taking out of a charter ought to involve inspection, supervision and publicity in the same manner and by the same agencies as we now regulate banks and insurance companies. This can be done by the general Government without depriving the States of the power of supervision of local corporations.

I repeat in conclusion that the right of association is the most important possession of the workmen of this country, and I shall be very much astonished when the matter is properly brought to their notice if Mr. Bryan's views and advice shall receive their support in the coming election. The future is full of promise for the productive interests of the country, but the election of Bryan on a platform which is at war with the principles of Democracy would destroy the confidence which now prevails, and absolutely arrest the progress toward industrial and commercial supremacy now possible and rapidly approaching for the United States in the markets of the world.

Heavy Rolling Mill Engines.

Among sales made recently from the Pittsburgh office of the Edward P. Allis Company, Milwaukee, Wis., is a compound condensing (direct coupled) heavy rolling mill engine, to the Duquesne Steel Works of the Carnegie Steel Company, at Duquesne, Pa. This machine is out of the ordinary in its design; it consists of one 44-inch diameter high pressure and one 78-inch diameter low pressure steam cylinder, each 60-inch stroke. The high pressure engine is placed in a horizontal position, while the low pressure engine is vertical. One bed serves both engines. The high pressure cylinder is coupled on the end of the bed through the slide barrel; the latter, as well as the high pressure cylinder, is supported on a deep cast sole plate, which is bolted to the under side of the main engine bed. The bed plate, which is 8 feet deep, is planed on top to receive the vertical low pressure engine. The low pressure engine is of the Edward P. Allis Company standard round column design, consisting of a heavy flaring circular frame, faced and bored to receive the bored column guide, turned on the outside to receive the gallery. The guide is round in shape, bored and faced at both ends; the joints between the frame and guide barrel, as well as the joint between the low pressure steam cylinder, are made male and female, thereby insuring perfect alignment. The top end of slide barrel, as well as the top end of frame, is turned to receive their respective galleries; the latter are made in quarter sections, the joints machined and bolted together, and then bored to a machine fit on the frame and guide barrel. The main shaft is 30 inches diameter where it receives the fly wheel, and is 28 x 48 inches in the main journals. The one end of shaft finds support in a journal provided in bed plate; the other end is supported on a high, heavy, box shaped outboard bearing. The main journal boxes are loose and babbitt lined; they are spherical shaped on the outside so as to respond to any disalignment or spring of the shaft, and afford a full bearing to the shaft under all conditions. The crank pin, which is 20 x 20 inches, is pressed into a cast steel

crank (on the one end of main shaft) and provides a bearing surface of 20 inches diameter by 10 inches in length for the high as well as the low pressure connecting rod. The fly wheel of this engine will be 24 feet diameter, weighing approximately 120,000 pounds. It will be noted that this design, one engine being horizontal the other vertical, coupled to the same crank pin, makes a quarter crank machine, at the same time occupies less floor space than a tandem machine, and only half the floor space required for a cross compound engine of the same size. The Edward P. Allis Company have recently installed for the American Steel & Wire Company at their Washburn-Moen plant, at Worcester, Mass., a reversing blooming engine of this same design, equipped with two 44 x 60 inch steam cylinders. This same firm have also received from the Manhattan Elevated road of New York City orders for eight units, each unit consisting of two machines of the same design as above described, one machine connected at each end of the same shaft; there being two 46-inch diameter high and two 88-inch diameter low pressure steam cylinders, each 60-inch stroke, to each unit.

The Cook Smoke Burning System.

A. S. Cook, a practical stationary engineer and an inventor, who has been working for some time on a method of overcoming the smoke nuisance in burning soft coal, has at length achieved what appears to be complete success. He has departed widely from the beaten track followed by the inventors of smokeless furnaces, who have hitherto endeavored to accomplish such complete combustion in the fire chamber as to avoid the production of any smoke. This point, it is asserted, is secured at very considerable preliminary expense in the preparation or construction of a suitable fire chamber, or in the introduction of steam in the chamber, which does not always accomplish the economical results claimed. The apparatus devised by Mr. Cook seeks to utilize the smoke produced by employing it as an additional factor in obtaining heat. Instead of endeavoring to avoid the production of smoke, this arrangement favors its increased volume. Following is a description of the method followed, which was recently observed by a representative of *The Iron Age*, at 460 Thirty-fifth street, Chicago.

The smoke is not discharged into the open air, but is drawn by means of a fan through a pipe of sufficient length to cool it. The pipe is connected either with another compartment in the same fire chamber, or, in the case of a battery of, say, three boilers, with fires under two of them, the pipe is conducted to the furnace under one boiler. Here it is caused to burn in a very ingenious manner. At a point in the pipe near the fan a spray of gasoline is forced by an air pressure of 60 pounds or more. A nozzle of the inventor's own design is used which separates the particles of the gasoline so thoroughly that the spray is vapor, not liquid. This vapor, mingling with the carbon forming the smoke, and also carrying oxygen from the air blown in with it, creates a highly inflammable mixture, which ignites readily in the fire chamber into which it is discharged, and there burns at a very high temperature and with absolutely no smoke. The quantity of gasoline thus used is quite small, and the power needed for the air pressure is also extremely light for the service required, so that these two additional elements in the fuel question do not materially add to the cost of operation. The very great heat produced by the burning mixture of carbon, gasoline vapor and oxygen more than compensates for the expense thus incurred. No draft chimney is required, as the draft is entirely forced. A mere outlet to the top of the roof is all that is needed for an occasional escape of the products of combustion when necessary. Tests of this apparatus have been made in the presence of engineers and others practically connected with the utilization of fuel, and the opinion is universal that an absolutely new method of preventing smoke and increasing the efficiency of fuel has been devised. The apparatus is controlled by Hawkins & Cook, 460 Thirty-fifth street, Chicago.

The national convention of Structural Iron and Bridge Workers, which was in session in Pittsburgh nearly all of last week, adjourned on Friday evening, having adopted a revised constitution and elected officers. The proposed universal scale of 50 cents an hour and the eight-hour work day were eliminated. The following officers were elected: John T. Butler, Buffalo, N. Y., president; William Purcell, Philadelphia, first vice-president; H. R. Mallen, Newark, N. J., second vice-president; J. M. Kelly, New York, secretary and treasurer; Thomas McGovern, Albany, N. Y., national organizer. Executive Committee—J. Boyd, Pittsburgh; W. A. Morrison, Washington, D. C.; Edward Ryan, Boston; Michael Reynolds, Baltimore; John Kingsley, Boston.

American Competition in the English Metal Market.

FROM A BRITISH CORRESPONDENT.

During the past two months the English ironmasters seem to have been playing a gigantic game of make believe. Although all the premonitory symptoms of a slump in prices have been observable, the British ironmasters have been doing their level best to maintain a market price which, while apparently real, was known to be fictitious. The various iron trade associations have met and solemnly fixed the market rate, while the component members have gone their several ways and sold at 2 shillings 6 pence or 5 shillings below the association prices. The prophecies that we have heard of late from the manufacturing end of the market have been optimistic beyond reason. None the less a feeling has been, and is, in the air that we are on the eve of a decided fall in market prices. There are many causes to which this may be ascribed. The South African War has had a distinctly depressing influence; the indirect results of the Indian famine are now being felt; the heavy demand which has characterized the last two or three years, is, in part, being exhausted, and is, in part, met by increased production; but it has all along been felt that the key of the situation was to be found in the probability or improbability of American competition. To keep out American iron and steel was to buttress the market for an indefinite period; it was felt that the moment American iron and steel got into the British market the slump was inevitable. It is instructive to observe how resolutely the British market has closed its eyes to the possibility of American competition. Six weeks ago Sir Benjamin Hingley, speaking at the Iron Trade Conference, declared that there was no possibility of effective American competition. He said that because America was sending over a few tons of iron, which was really mild steel and not puddled iron, there was not any likelihood of the Americans commanding the market. He proceeded somewhat incautiously to remark that if they exercised patience for a few weeks they would see a revival of the buying of iron. But he entirely overlooked the real issue, which is that the makers of metal goods are waiting for a reduction in the price of metals. That was the situation a month or six weeks ago. But now there may be observed a transference of power from the makers of iron to the jobbers. When iron or steel is in strong demand the makers have it all their own way, but when the market slackens the dealer steps in and once again dictates his terms. An interesting indication of what is happening is to be found in an incident which occurred a fortnight ago in Glasgow. A certain merchant firm, who are the largest importers of American steel plates, are again buying in America; the members of the Glasgow trade were invited by one of its members to refuse to sell Scotch steel plates to the merchant firm in question with a view of forcing them to stop importing American steel plates. As the merchant firm in question are in a strong position and have a large number of specifications to distribute, it soon became evident that the smaller steel makers were not in a position to defy them. The result is that this large firm are in a position to buy in America without interference from the Scottish steel makers. The position is rendered still more unsatisfactory from the point of view of the British maker by the virtual dissolution of the Scottish Steel Trade Association, while Scottish malleable iron has been weakened by undercutting in Staffordshire and the northeast of England. Add to this the fact that German firms are now actually reselling pig iron both in Scotland and the north of England, and it is apparent that the iron and steel market of England is in the first stages of that kind of disorganization which precedes a trade slump.

Demand for Lower Prices.

As things are at the moment then there are no buyers because prices are too high, and not because there is no demand. The makers of finished iron are all holding out for their prices, and completing old contracts, while the foundrymen and manufacturers of metal articles, finding themselves squeezed upon the one hand by the buyer, and upon the other by the ironmaster, are waiting events. The English ironmaster is devoutly praying that eastern freights may go up, and that transit shall neither be regular nor prompt. Indeed there is some anxiety at the present moment as to whether material already bought can be delivered according to contract under the specified time. There are several consumers who are depending upon the delivery of American steel plates to enable them to complete their contracts with their customers. Confirmation is now to hand that Mr. Carnegie is selling 4000 tons of American steel of a low qual-

ity, and this looks like the beginning of effective American competition.

Proposed League of Coal and Iron.

Meantime a proposal has been made by F. G. Meachem, manager of a large colliery company in South Staffordshire, that there should be a combined coal and iron league, whose task should be to collect information in reference to selling prices of foreign made iron on the English market, and so to arrange the price of coal as to allow of the making of iron at such a price as would enable English makers to compete in every market. This proposal is receiving widespread attention, and has been duly commented upon in the press, prominent ironmasters and colliery owners are being interviewed upon the subject and something may come of it. As nearly all the prominent colliery proprietors are also largely interested in iron, it is just possible that they may deem it wise policy to transfer some of their profits upon coal to iron, but there does not appear to be any immediate likelihood of the price of coal coming down, and, accordingly, American makers who think of jumping into the British iron ring need not be deterred from their intentions because of this proposed combination. Prices are likely to continue for a few months to come at a high level. During the past two months the average price of bars has been about \$49, angles and tees \$51, plates and sheets about \$53.50. It is upon these prices that the wages in the sliding scale district of the Midlands have been fixed. Looking at the facts as I see them at the moment, I feel convinced that if eastern freight can be fixed at reasonable rates, and there is any surplus in the American market, there is reason to believe that substantial sales could be effected over here.

S. G. H.

American Steel Substituted for Imported Swedish.

That the American steel makers are constantly improving the quality of their steel is demonstrated by the fact that it is being used more and more for purposes for which foreign steel was used exclusively a few years ago. A case in point that has recently come to our notice is that of the steel being used in the wire for the East River Bridge, which is being drawn by the John A. Roebling's Sons Company of Trenton, N. J. The Roeblings formerly bought imported Swedish steel for making this class of wire, not being able to get anything in this country that would give them the results desired. After an exhaustive series of experiments, they found that acid open hearth steel made by the Carbon Steel Company of Pittsburgh would fully meet their requirements, and, as a result, an order for 6000 tons was placed by the Trenton firm with the Carbon Company. The steel has proved so satisfactory for making the wire for the bridge that the question is now under consideration of substituting for the No. 8 called for in the specification No. 6, which has been found to carry 230,000 tensile strength. About 4000 tons of wire will be required for the East River Bridge, but the Roeblings have placed an order with the Carbon Steel Company for 6000 tons of steel. The New Jersey Steel & Iron Company had a great deal of trouble in getting the proper quality of steel for making their rivet rods. Several concerns furnished small lots of steel for trial, all of which was found to be unsatisfactory. Finally the order was placed with the Carbon Steel Company to furnish this steel, which, we are advised, fully met all requirements. The Carbon Steel Company make acid open hearth steel exclusively by what is known as the pig and ore process. Their trade is principally with railroads and parties who desire a high grade material.

The Department of Public Works of Pittsburgh, George W. Wilson, Director, are advertising for the erection of a new steel truss bridge across the Monongahela River at Tenth street, South Side, Pittsburgh. The bridge is to be 40 feet wide and 1417 feet long, and has a paved floor. The estimated cost is \$300,000, and a bond in double that amount is asked. Bids for the erection of the bridge are to be closed November 15, and it is expected about one year will be required to complete the structure.

A jury in a local court on October 26 returned a verdict in favor of the city of Chicago in the suit brought by Armour & Co. for damages resulting from the destruction of property in the American Railway Union strikes in 1894. The case is regarded by the city officials as a test of the right of injured parties to collect damages from the city for loss of property during riots. The amount asked in the Armour case was \$800. Nearly fifty cases are pending, representing an aggregate amount of over \$2,000,000. In a previous case the city

lost and has appealed to the United States Court of Appeals. In that case a claim of \$30,000 was brought against the city by the Pennsylvania Company.

The Hartman Pig Iron Casting Machine.

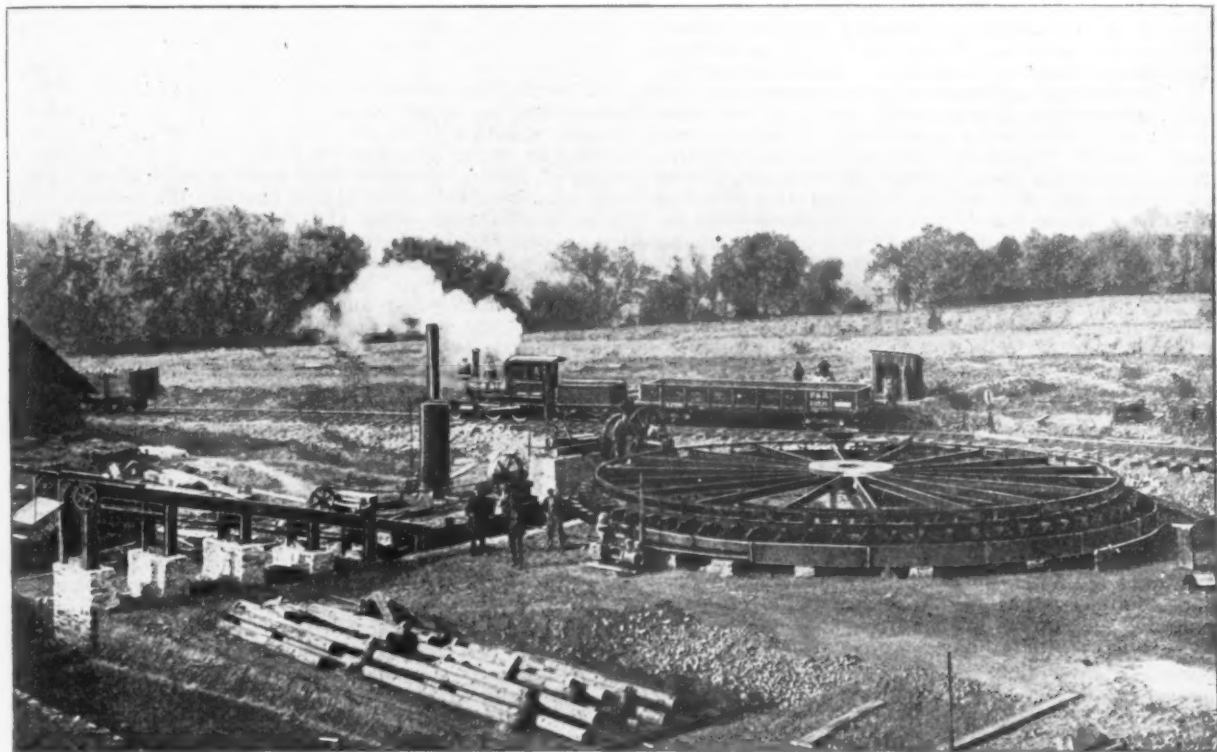
At one of the furnace plants in the Lehigh Valley there is now in operation a pig iron casting machine designed and built by the Hartman Company of Philadelphia. As will be observed from the accompanying engraving of a photograph of the machine, it is circular and rotates. The molds, of thin wrought iron or soft steel, are suspended from the outside of the rotary table in a carrier which is secured to the end of a rock shaft. These rock shafts are secured by proper bearings to the rotary table. The inner ends of the rock shafts have spur pinions keyed to them, which engage with a rack at proper intervals to dump the pig and another rack to return the mold to position. An arm with stops on each rock shaft limits the rock of the molds and returns to exact position for pouring. Just before reaching the pouring spout the molds are lowered slightly on the rear, which allows the surplus metal to run over the rear end of molds and

it. By this arrangement the mold moves in one continuous plane and travels through troughs having two water levels.

Shortly after leaving the end of the last trough the carrier and mold is rocked over 130 degrees by the pinions and rack. The pig is discharged onto an incline chute having a curved surface in order to allow it to slide off gently onto the conveyor chains. The molds continue on a short distance in this inverted position, which drains them of all water and gives time to dry (by the heat in the molds) before they reach the duster. The molds being rocked back to their proper place pass under a duster which coats them inside with dry bituminous coal to prevent the iron from sticking to the molds.

As these molds pass under the spout endways the metal does not pour continually on one spot and burn fast to the mold. The action of the molten iron pushes the coal dust ahead in the mold and makes a perfect coating. After a mold has passed round the rotation and gone through the water the coating will be found by rubbing the hand along inside the mold.

The rotary table is made of girders and has a center like that ordinarily used. A circular jet water pipe is carried over the first section of the water trough. The



THE HARTMAN PIG IRON CASTING MACHINE.

makes the pigs of a uniform thickness. As soon as the mold is poured the rear end is raised up to its proper position. This prevents any spilling of the iron after the mold enters the water.

The mold carrier and all parts connected with it are nicely balanced to work with little power. The cradles have a double crank arm to allow the molds to be submerged in the trough and carry the crank part of the carriers above the edge of the trough. Each mold has a dividing piece on its front end in order to cut off the flow of running metal and direct it to the following mold. Flanges on the ends of dividers prevent the spilling of the metal over the sides of molds.

The trough in which the molds are carried has two water levels. The carrier with the mold enters the lower level at the end of the trough, which for 5 feet conforms to the shape of the carriers. This forms a moving dam to push back the water into the wider part of the trough and prevent its escape, except a small portion to give a little freedom to the carriers. The end of the trough is flexible to allow it to be pushed down in the event of scrap iron getting between the carrier and the trough. This prevents a break down. The water in the first or lower level is kept 1 inch below the top of mold by an overflow.

The mold passes through the first trough and meets a short restriction in the trough 5 feet long which acts as dam to dam the water of the second or high level trough. On passing into the second level the mold is overflowed and remains so until it reaches the short restriction at the discharge end of the trough, when the mold leaves

duster is operated by a lever, having a roller operated by the teeth of the rack which revolves the machine; each tooth moves a slide which causes the dust to fall in a continuous shower on the molds. The rotary table is driven with an engine geared into the rack with a pinion. The pinion shaft overhangs some distance and springs if an undue strain is brought on it. In this event the side movement throws a trip lever which instantly applies a brake to the fly wheel and stops the machine before any damage is done. There is used a combination conveyor and elevator composed of five link belts with special projections for the pigs to fall on and to move the pigs up the incline. A straight water trough through which these belts pass gives the final cooling to the pigs before they go up the incline to be dumped on the car. This prevents the car being set on fire. This conveyor travels slowly and keeps the pigs submerged for five minutes.

To start the machine it is necessary to grease all the molds with any cheap grease, otherwise the wet molds will make the metal splutter and fly. This is only required for the first round, after which the heat in the mold will dry them. All danger of spluttering is then past and the machine continues on until the cast is poured. The duster having coated the mold it passes under the iron spout, where the stream of iron falls on the mold at an incline; care being taken not to let it impinge on the mold at right angles. The bituminous coal burns all over the inner surface of the mold, giving a coat of soot which effectually prevents all sticking of the pig in the mold. As quickly as the mold is poured the

underside is spurted with jets of water, which continues until the mold enters the trough and catches the trough water. The carriers fitting the small part of the end of the trough act as a pump to push the water and force it up around the mold where the water is kept 1 inch below the top of mold. After the molds travel 8 feet in the lower level or first trough they meet the spray from the circular pipe above, which falls on the face of the pig and chills it, forming a shell over the molten metal before the mold reaches the higher level where it is overflowed. Sufficient time must elapse before applying the spray to the top of the pig to allow the occluded gas in the molten metal to escape. If the shell is formed too quickly the gas in the metal collects and expands, leaving a large cavity in the interior of the pig. In some cases the pig has exploded from this cause when the mold was only partly filled. After the exit of the mold at the end of the trough a man pushes a sharp pointed bar under the end of the pig to make sure that the pig has not stuck to the mold. In doing this the pig is pushed out of its position, which allows the water in the mold to run under the pig and cool it further.

In pouring the mold care has been taken to place the trough so that no water can come in contact with the pouring iron, the mold being completely poured before it reaches any water. This is necessary to prevent an explosion.

This machine is especially intended to run the metal direct from the furnace. To meet a rush of metal from the furnace the machine is placed in the far end of cast house. For the ordinary sand runner supplying each pig bed as at present a cast iron runner lined with fire brick is substituted. This runner being long will hold a large amount of metal. The end of the runner at the machine, where it delivers the metal in the pouring spout, can be raised or lowered. By raising this end the metal is dammed back in the runner and held in reserve. If the rush is too large the metal overflows at the end of trough next the furnace and runs into chills provided for that purpose. The end of the runner next the furnace is provided with a flexible sand joint to prevent any escape of metal. Suitable arrangements are made to raise and lower the runner.

Rushes of metal can be avoided by using an infusible iron notch, which always holds the opening to one size. This notch is tender and friable and is opened by a small blow pipe. The plug to stop the notch is compressed charcoal, which is quickly burned out by the blow pipe and the iron is reached. This blow pipe heats up the notch and prevents a small stream from freezing in the hole, which often causes great trouble to get the hole open again. All sledging is dispensed with. As there is a continuous moderate flow of iron from the notch the walls around the notch do not get hot and melt away, causing a large hole, as is the case with the ordinary stopping. These notches are simply clayed in and last about seven days with ordinary care.

As soon as cinder shows at the notch blast is slacked, the plug stuck in and blast put on. The cinder has no business at the iron notch. Keeping a blanket of cinder over the iron at all times gives a better grade of iron.

The machine is designed to quickly chill the molten metal sufficiently to dump the pig from the mold without breaking it at conveyor. There it can be entirely surrounded by water, which does the balance of the cooling more rapidly. This conveyor runs 10 feet per minute and is quite short. It is cheaper to use a small machine and a longer conveyor. The use of wrought iron or soft steel molds avoids the pitting of cast iron molds and the sticking of the pigs in the molds, as well as the extra heavy coating of lime wash required with cast iron molds.

Pouring the metal all over the surface of the mold a skin of cold metal is formed under the pig, and the water abstracting the heat through the mold keeps the temperature low, preventing any fusion of the metal and mold. It is this quick action of the water through the thin mold with its slight sooty coating that saves it. Where the metal flows continuously over one portion of the mold an extra heavy coating is required, but even with it the mold will crack in time. The plumbago nozzle in the pouring spout keeps a continuous sized opening, wears away slowly, keeps the pouring angle uniform and is cheaply and quickly replaced.

It will be noticed that the carriers with molds are hung outside of the rotary table, and all the machinery is kept away from the spout, which is done to prevent destroying the machinery by an overflow or accident. If there should be an overflow only the mold under the spout suffers. A new mold is quickly inserted and the old mold is put to shape in the smith shop at leisure. Placing the machine in the lower end of the cast house keeps it under cover. The men at the furnace run it. The ladle, the locomotive, the tracks, the extra men and the heavy ladle skulls are avoided.

The machine requires three men to run it on each turn. One of these men has charge of the machine on each turn to oil it and keep it in order. The conveyor

of the machine delivers the pigs on the regular railroad cars, which avoids extra handling.

Iron and Steel in Scotland.

The Shipbuilding Industry.

GLASGOW, October 18, 1900.—The iron and steel trade of Scotland is in a peculiar position just now, situated, as it is, between the devil of high costs and the deep sea of foreign competition. As yet American pig iron has not found its way to any extent to the Clyde, which is the largest shipbuilding center in the world. But American steel ship plates have; and in consequence of the heavy arrivals and forward contracts of American plates the Scotch makers have had to reduce their prices to a level which they declare to be wholly unremunerative at the prevailing costs of fuel and of crude iron. The nominal price of Scotch ship plates at the date of writing is £8 per ton, less 5 per cent., say £7 12s. net. But as a matter of fact makers are not selling at these prices, and merchants have contracted to deliver at £7 5s. net, in sure and certain hope of being able to cover at a fair profit later on. What the Scotch shipbuilders are now mainly working on—at all events those of the Clyde district, which is handy for imports by sea—is American material, which has been sold down to £7, and for forward delivery at even under that figure, delivered at ship. It is sufficiently curious that Glasgow, which supplied the plates for the first vessel built of steel in the United States, should now be able to revive its shipbuilding industry by means of American steel. For it was the high price of plates, raised by local makers some £2 10s. per ton within a twelvemonth, that checked the demand for new vessels, even while the demand for tonnage was great and freights were high. Between 1897 and 1900 the cost of construction of a high-class steel steamer increased about 70 per cent. at the extreme prices; but at present the difference cannot be more than 35 per cent. Hence the shipbuilders are now booking more freely, and are full of work that will keep them actively employed well over next year, while it is known that there are a good many orders for merchant steamers and for the Royal Navy still to be placed.

But the improved and improving condition of the shipbuilding industry has not improved the Scotch iron trade. The demand for finished iron and steel in all other branches of consumption save shipbuilding seems to be steadily declining with the shrinkage of trade all over the world. And Scotch manufacturers are handicapped in pursuing retreating business by dear pigs, dear coal and high wages. Scotch smelters do not burn coke in their blast furnaces, but a special quality of splint coal. Most or all of them are coal owners, but most of them have to buy from other coal owners a large portion of the splint coal they consume. The special quality required for the furnaces is found only in a few pits, so that practically the supply is in the hands of two or three firms. They make the price—not the consumers—and they have made the price so high this year that iron smelting in Scotland must have left a dead loss at times but for the utilization of the by-products of the furnaces, for which good prices have been obtained. For several months past the price of furnace coal has been kept at 15 shillings per ton, at the pits, or just about double what it was before the great rise in coal began. On the basis of 2 tons of coal to the ton of iron smelted, this alone means an addition of 15 shillings per ton to the cost of producing pig iron. From normal prices the advance is about 20 shillings per ton. Then, all the hematite ore for the Scotch furnaces has to be imported, chiefly from Spain, and the advances in ore and in freights have added still more to the cost of pigs.

Latterly smelters have been still further bothered by the exaggerated alarm of the Spaniards at the occurrence of a few imported cases of so-called "plague" in the harbor of Glasgow. The imposition of quarantine on ships from Glasgow has greatly interfered with the shipments of iron ore from Spain to that port. However desirous smelters may have been, therefore, of helping manufacturers with cheaper raw material, although there is no reason to suppose that iron smelters are any less disposed than other people to make all they can, they in turn are severely handicapped.

The Germans have been large and eager buyers of British pigs (chiefly from Middlesbrough-Tees, however) all along, but latterly their demands have fallen off greatly, partly because of reduced consumption in their works and partly because of the shipments of American pigs. Indeed, Germans have been reselling in the Middlesbrough market hematite pigs bought there in past months for autumn shipment to Germany.

The trouble is, moreover, that while Germany is now buying less British pig iron, she is beginning to compete actively again with British iron and steel makers, and is

also pressing so hard upon Belgian makers that they are driven in turn to compete frantically for foreign business. And thus it is that the British markets are becoming overwhelmed with American, German and Belgian materials at prices which British makers cannot touch, and which are doubtless leaving the German and Belgian competitors with heavy losses.

The Scotch iron trade is so largely dependent on ship-building that it ought now to be in a fairly prosperous condition. But it is not, for the reasons which have been stated. American bars have lately been delivered right into the new heart of the Scotch malleable iron trade (Coatbridge) at prices below what local dealers would or could sell at. Tube making is a large trade in the west of Scotland, and American strips have undersold local makers there. And so on. It may be that the prices at which these parcels of American goods are sold leave no profit on the cost of production and transport. And it is doubtful if the business can be a continuous and permanent one. But it is enough in the meantime to bring Scotch producers to the choice of selling at a loss or closing down works. And as a matter of fact works have been slowed down pretty nearly all round, though in few cases has absolute stoppage been necessary. Until recently trade has been very prosperous, and has had a long term of healthy activity, with, of course, a fair supply of running contracts left over.

Pig Iron Warrants.

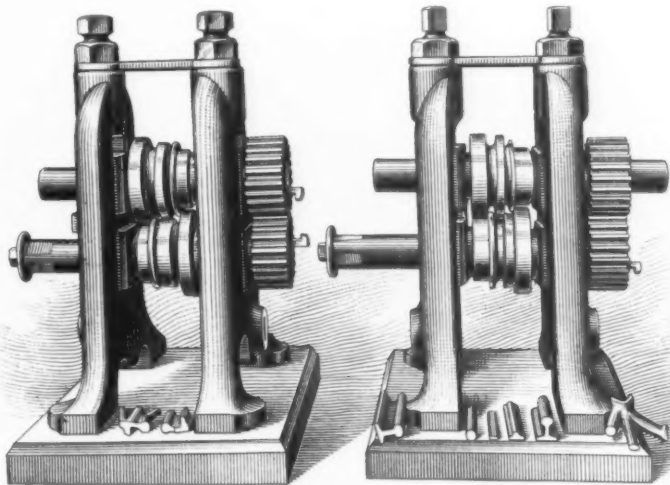
One evidence of the perplexed condition of the Scotch iron trade may be found in the position of pig iron war-

Rolls for Splitting Old Steel Rails.

Adam Nisbett and W. G. Ives of 1507 Harvard street, Chicago, have invented the rolls herewith illustrated, which are designed for splitting old steel rails into three separate bars suitable for rolling into merchant bars. The first roll will change the shape of the rail, and one more pass on the cutting roll will divide the rail in three bars. This is done without leaving burrs or rags. The rolls will cut the rail so clean that the pieces will also make good wire rods as well as merchant bars.

The usual rolls or machines employed for splitting steel rails require a great deal of time to keep them in good condition. If they are not in perfect order they leave a fin on each bar and two fins on the center bar, and in rolling the bar down into merchantable product the fin laps over and forms a sliver, as it will not weld like iron. Another difficulty found in splitting steel rails with the usual machines is that after working for a day or even less time the rolls become dull and will not cut the rails quite through, thus causing much additional work in tearing or twisting the pieces apart, besides involving a great deal of waste. It has further been necessary with appliances heretofore used to cut the rails into short lengths before splitting them.

The cutting roll of the device illustrated is so designed that even without the shaping roll it will in one pass cut a long length rail in three separate bars and with square edges. The use of the shaping roll is, however, deemed desirable for regular working. It is not necessary to have perfectly sharp edges on the cutting



ROLLS FOR SPLITTING OLD STEEL RAILS.

rants. The stock of Scotch G. M. B. iron in the warrant stores is only about 80,000 tons, and it is still generally declining. The warrants have dropped from 77 shillings in September to 66 shillings in October, and speculation has quite passed out of the "ring." No doubt the main reason for this is that not only the Glasgow stock, but also the stocks in the warrant stores of Middlesbro and Cumberland, have been cornered by the London syndicate, who, having frightened the bears by the squeeze they gave them at September settlement, have dropped the price in the hope of tempting some bulls in to graze. But the other reason is that makers' prices are coming down in spite of costs, and this is why the bulls will not be tempted by a price for warrants out of all proportion to the stocks. The average price of Scotch warrants in 1899 was £63 9s., and that year began with a stock of 390,000 tons in the warrant stores. Back from 1899 we have to go to 1890 to find a quotation of 66 shillings, and that year began with a stock of 1,035,000 tons. And in 1889, when the warrants barely reached 65 shillings at highest, the year began with a stock of 1,244,433 tons.

In all the stores in the United Kingdom there are only 140,000 tons (not all of which is on warrant), and this total compares with 525,000 tons at the beginning of the year. It is a stock too small to speculate with, but so small, so greatly depleted during the year still current, and so steadily diminishing, that warrants would certainly be at a fancy price were it not for the influences to which we have been referring. There seems little doubt that coal has seen top in Great Britain, and that it will now come gradually down. The fall is not likely to be rapid, with the extra winter consumption coming on and with wage agreements guaranteeing maximum rates to the miners until February. But it has begun, all the same, and every shilling down will be a grant in aid of the iron trade.

B. J.

roll, as it punches the center squarely through. The inventors claim that it will cut over 1000 tons of rails without requiring repairs. The cutting roll, which is 18 inches in diameter, can be cast solid, but it is found that the cheapest and best way is to make the roll body of an octagonal shape and put collars on with a jam nut. The collars are made of chilled iron to wear well and to stand up under the work. These rolls can be set close to the saws in a rail mill, and shear the rail crops at the same heat as that at which they are sawed, making bars suitable for drop forgings, &c. They can be added to any train of rolls in other mills.

At one time much trouble was experienced in reworking old steel rails because of their high carbon contents. This trouble has, however, long since been overcome by putting the rails in a soaking pit or annealing furnace. This does not entirely draw the carbon, but it makes rail stock much more easy to work, and large quantities of old steel rails are now reappearing in merchantable forms after going through splitting rolls and merchant rolling mills.

Consignments of steel billets and other articles of iron and steel for the new transatlantic freight line which is to be inaugurated on November 5 by the Pittsburgh, Bessemer & Lake Erie Railroad Company are being shipped. The consignors are the Carnegie Steel Company and the consignees are H. R. Merton of London, England, and Mellen, Griffiths & Co. of Cardiff, Wales. The billets will be taken from Pittsburgh to Conneaut Harbor via Pittsburgh, Bessemer & Lake Erie Railroad, and will then be loaded on boats, which will proceed by Welland Canal to Montreal and thence by Atlantic Ocean. The entire shipment will consist of 4000 tons and the boats will probably leave Conneaut Harbor on November 5.

Specifications for Foundry Materials.

C. Scott, chemist of the J. I. Case Threshing Machine Company of Racine, Wis., has drawn up a series of specifications for foundry materials which form the basis of the purchases by that company. We reproduce them below:

Foundry Coke.

Under this specification we desire a good, clean 72-hour coke, as free as possible from coke dust and cinder.

The percentage of wall coke, known as "black heads," must not be greater than that usually found in "Selected" No. 1 foundry coke.

The coke should be of the massive form and reasonably free from small particles—i. e., granulated coke.

Structure is an important feature and will be considered when purchasing coke.

The structure of a perfect 72-hour coke should, according to theory, be made up as follows:

	Per cent.
Cellular structure.....	56.00
Coke structure.....	44.00

We do not expect to get a coke with an ideal structure, but we do insist on a coke with a proper structure for cupola work.

Our castings are made according to specifications, and, as the iron is mixed by analysis, it is absolutely necessary that the coke be low in sulphur and phosphorus.

Well washed coke should not exceed the amount of sulphur herein specified.

When a car of coke is received it will immediately be sampled by an experienced man, who will select two average samples (ten pieces) of the coke from different parts of the car, and these two samples will be sent to the laboratory for a check analysis.

The coke will be accepted if it comes within the following limits, viz.:

	Per cent.
Moisture should not exceed.....	1.50
Volatile matter should not exceed.....	3.50
Fixed carbon must be above.....	86.00
Sulphur must not exceed.....	0.75
Ash may range from.....	5.50 to 11.50

Coke will be rejected which shows on analysis:

	Per cent.
Sulphur, more than.....	0.85
Phosphorus, more than.....	0.05
Fixed carbon, less than.....	85.00
Ash, less than.....	5.00

These limits will be strictly adhered to and no concessions made in any case.

NOTE.—The Heinrich method is used for all determinations in the proximate analysis of coke, except sulphur, which is determined by Eschka's method.

When sulphur is included in an analysis it is to be understood that the volatile matter carries one-half and the fixed carbon the other half of the per cent. due to this element.

The two following analyses of a light and a strong coke will give a good idea of our method and statement of a coke analysis. Both of these cokes are within the limits of the specification; No. 1 is a light coke and No. 2 is a strong coke:

	No. 1. Per cent.	No. 2. Per cent.
Moisture	0.33	0.49
Volatile matter.....	2.25	1.31
Fixed carbon.....	90.54	87.46
Sulphur	0.60	0.72
Ash	6.28	10.02
Structure, cells.....	52.94	50.04
Structure, coke.....	47.06	49.96
Specific gravity.....	1.697	1.890
Heat units (per lb.).....	13,540.	12,937.

No. 1 is a light coke with medium porosity and will give a quick, intense heat.

No. 2 is a strong coke and will hold up a heavier burden of iron; the porosity is lower—i. e., the coke is more dense—consequently a stronger blast is required.

A strong, heavy coke will give a steady, continued heat.

Foundry Pig Iron.

(Revised July 14, 1900.)

Under these specifications we desire a good, clean iron, as free as possible from dross, kish, oxide, sand, &c.

The per cent. of "sows" must not vary to any great extent from the usual amount found in a strictly graded iron, according to the old fracture method.

All grades of pig iron will be bought strictly by analysis and must conform to the following specified per cents.:

	Per cent.
FOUNDRY NO. 1.	
Silicon must not be less than.....	2.50
Sulphur must not exceed.....	0.03
Phosphorus should not exceed.....	0.60
Manganese should not exceed.....	0.50
Total carbon, not specified.....	

The carbons will usually be between 3 and 4.50 per cent. in this grade.

Any car of No. 1 foundry pig which shows on analysis less than 2.40 per cent. of silicon or more than 0.035 per cent. of sulphur will be rejected. (See remarks under head of note.)

FOUNDRY NO. 2.

	Per cent.
Silicon must not be less than.....	1.95
Sulphur must not exceed.....	0.04
Phosphorus should not exceed.....	0.70
Manganese should not exceed.....	0.70
Total carbon, not specified.....	

The carbons in No. 2 will generally range from 2.90 to 4.20 per cent.

Any car of No. 2 foundry pig which shows on analysis less than 1.85 per cent. of silicon or more than 0.045 per cent. of sulphur will be rejected. (See note.)

FOUNDRY NO. 3.

	Per cent.
Silicon must not be less than.....	1.35
Sulphur must not exceed.....	0.05
Phosphorus should not exceed.....	0.80
Manganese should not exceed.....	0.90
Total carbon, not specified.....	

The carbons in this grade will usually be between 2.50 and 4 per cent.

Any car of No. 3 foundry which shows on analysis less than 1.25 per cent. of silicon or more than 0.055 per cent. of sulphur will be rejected.

NOTE.—It is distinctly understood that all grades of pig iron will be bought according to analysis and not by fracture.

As we mix by analysis in the foundry, it necessarily follows that the pig iron should be according to specifications; furthermore, if we accept an iron as No. 2 which fails to fill the No. 1 conditions, we might eventually be overstocked with No. 2 and be unable to get the results aimed at in the cupola mixture; consequently an iron sold as No. 1 or any other specified grade will be rejected if not strictly within the specifications for said grade.

When a car of pig iron is received it will immediately be sampled by an experienced man (professional sampler), who will select a certain number of pigs from different parts of the car which according to his judgment shall represent the average quality of the iron. These pigs will be broken and drillings taken from the face of the fracture will be sent to the laboratory for a chemical analysis. The analysis will decide the acceptance or rejection of the iron.

Rejected cars will be held subject to the shipper's order.

In case of dispute the furnace or the seller shall have the right to resample the iron in conjunction with the buyer, each to select five pigs.

Drillings from the ten pigs, after being well mixed, will be divided into three different samples, one lot to be analyzed by the furnace, one by our laboratory and one by a disinterested chemist, agreed upon by the parties in dispute.

The two analyses nearest alike will be accepted as the proper chemical composition of the iron.

In all chemical work relating to pig or cast iron it is understood that the standardized drillings furnished by the American Foundrymen's Association are to be used as "standards."

The following chemical methods are used in our laboratory—viz.:

Silicon.—Drown's method.

Sulphur.—Evolution and titration with iodine (volumetric), as a rapid method, and the oxidation method (gravimetric) in all cases of dispute.

Phosphorus.—Emmerton's method for rapid work and the molybdate magnesia method for very accurate determinations.

Manganese.—Deshay's or the colorimetric method for rapid work and the acetate process for extremely accurate work.

Carbons.—Carbons are worked by the colorimetric and combustion methods.

In case of dispute check analyses are made by gravimetric methods.

Silver Gray (S. G.) or Silicon Pig.

Under this specification we expect a pig iron medium high in silicon and not too low in graphitic carbon. This iron is to be used as a softener.

	Per cent.
Silicon must not be less than.....	3.00
and should not be more than.....	5.50
Sulphur must not exceed.....	0.04
Phosphorus should not exceed.....	0.90
Manganese should not be less than.....	0.30
Total carbon should not be less than.....	2.50

Any car of S. G. iron showing on analysis less than 3 per cent. of silicon or more than 0.055 per cent. of sulphur will be rejected.

Ferro-Silicon Pig Iron.

Under this specification we prefer a pig iron with about 8 per cent. silicon.

The general range for silicon in this grade is from 6 to 12 per cent.

Silicon must not be less than.....	Per cent.
or more than.....	7.00
Sulphur must not exceed.....	12.50
Manganese, not specified.....	0.04
Total carbon, not specified.....	

As a rule the graphitic carbon will be low, carrying from 3 to 0.50 per cent.

Manganese may occasionally vary from 0.20 to 3 per cent. or more.

Cars will be rejected which show less than 6 per cent. of silicon or more than 0.045 per cent. of sulphur.

Manganese Pig (Manganiferous Iron).

In this specification we desire an iron of from 1 to 2.50 per cent. manganese.

The ordinary No. 1 pig iron, running about 1.50 per cent. in manganese, will fill all the conditions required.

Silicon should not be less than	Per cent.
Sulphur must not exceed.....	2.50
Phosphorus should not exceed.....	0.04
Manganese must not be less than.....	0.70
Carbon, not specified.....	0.90

As a rule the higher the manganese the greater the proportion of combined carbon.

Combined carbon may range from 0.30 to 3 per cent., while the graphitic carbon may vary from 0.40 to 3.50 per cent.

NOTE.—A few remarks on manganiferous irons may help to define the dividing line between the ordinary foundry pig and the regular manganese iron.

Manganese pig is an ordinary iron made from ore containing somewhat more manganese than the regular foundry irons; it will run from 0.80 to 3.50 per cent. in manganese. It is added to foundry pig, in cupola practice, to raise the combined carbon, thereby increasing the strength. In a measure it neutralizes the effect of sulphur, removes excess of gas and prevents blow holes. It must, however, be used with caution, as a low silicon and carbon, with high manganese, gives hard iron and alters the shrinkage.

Spiegel iron is used mostly in steel making. It is supposed to contain from 10 to 25 per cent. of manganese, but some authorities place the range from 3.50 to 20 per cent.

Ferromanganese contains from 25 to 90 per cent. of manganese. Most of the ferromanganese on the market runs about 80 per cent. of manganese. With 80 per cent. of manganese present there is not much room for iron. The metal, however, usually contains sulphur, phosphorus, carbon and silicon.

In cupola practice the amount of ferromanganese used is generally very small, consequently the effect of the other metalloids is not great.

Manganese has a tendency to keep the carbon in the combined form; hence it lowers the graphitic carbon, thereby reducing the deflection. It neutralizes the effect of sulphur by reducing red shortness, and indirectly offsets the cold shortness or brittleness caused by high phosphorus.

In foundry practice the more manganese present in the pig the more silicon and graphitic carbon required to produce soft castings.

For "chill mixtures," where great toughness is required, a pig with 2 per cent. manganese and less than 1 per cent. silicon is a desideratum.

Malleable Bessemer Pig.

This specification will cover both the "common" and "straight" malleable Bessemer.

When the straight Bessemer pig is specified it is understood that the phosphorus is not to exceed 0.10 per cent. Straight Bessemer, with 1 to 1.50 per cent. of silicon, about 0.60 per cent. manganese, under 0.11 per cent. phosphorus and below 0.04 per cent. sulphur, will be satisfactory.

In common Bessemer the following limit will be specified:

Silicon may range from.....	Per cent.
(Silicon of..... per cent. preferred.)	0.70 to 2.10
Sulphur must not exceed.....	0.045
Phosphorus must not exceed.....	0.15
Manganese may range from.....	0.30 to 1.20
(Manganese of..... per cent. preferred.)	
Total carbon should not exceed.....	3.75

As a rule, the combined carbon will vary from 0.30 to 1.30 per cent. and the graphitic carbon from 3.45 to 1.80 per cent.

Preferred figures will be marked in red ink, and when specified we expect to get an iron not varying more than

0.10 per cent. either way. When no preferred figure is specified the silicon and manganese may be anywhere within the above limits.

The iron will be rejected if the analysis shows more than 0.05 per cent. of sulphur or more than 0.18 per cent. of phosphorus.

Charcoal Irons.

Charcoal iron differs from coke iron mainly in regard to the carbon.

The graphitic carbon appears to be in a finer state of division, and when changed into the combined form it produces a closer grain and stronger metal than does a coke iron with the same amount of total carbon. It is especially adapted to chill work, and by regulating the amount of silicon and carbon it is possible to get any desired chill.

The sulphur, phosphorus and manganese are quite constant in charcoal iron; the silicon and carbon vary to a decided degree, and these two elements will govern the various grades.

Graded according to fracture, there are usually seven distinct grades, designated by letters and numbers, and in some cases branded as "soft," "foundry," "medium," "high," "low," &c. (high and low referring to carbon).

Charcoal iron ranges in silicon from 0.30 to 3 per cent. The total carbon will run from 2.50 to 4.50 per cent., in some cases even higher.

In this specification we shall not specify any grade or number, but will ask for "preferred" per cents., as follows:

Silicon, general total range.....	Per cent.
(Silicon of..... per cent. preferred.)	0.30 to 2.75
Sulphur must not exceed.....	0.025
Phosphorus must not exceed.....	0.25
Manganese should not exceed.....	0.70
Total carbon, general range.....	2.50 to 4.50
(Carbon of about..... per cent. desired.)	

Preferred figures to be marked in red ink.

Low carbon will be understood to closely approximate 2.50 per cent., medium carbon as 3.50 and high carbon as 4.50 per cent. or above.

NOTE.—Charcoal iron gives a "chill" in accordance with the amount of silicon present, the other constituents remaining constant, or nearly so.

The following table is approximate, but near enough to give some idea of the effect of silicon on the carbon:

0.30 per cent. silicon is equivalent to	1 1/2 inch chill.
0.40 per cent. silicon is equivalent to	1 inch chill.
0.52 per cent. silicon is equivalent to	5/8 inch chill.
0.70 per cent. silicon is equivalent to	1/2 inch chill.
1.00 per cent. silicon is equivalent to	3/8 inch chill.

Above 1 per cent. a chill may be induced by increasing the sulphur or by altering the amount of manganese and carbon.

With manganese at 0.50 per cent. and sulphur at 0.095 per cent. in a mixture, the castings will take on a decided chill even with medium high silicon.

Sulphur increases, silicon diminishes, manganese toughens or stiffens, and phosphorus remains neutral in regard to chill.

A high carbon will give a high, shallow chill, while a low carbon gives a soft, but deeper chill.

Chill is governed to a great extent by the cooling of the molten iron, different results being obtained by pouring against a large or small surface chill plate; also in pouring horizontally or vertically against the chill. A reverberatory furnace gives better results than a cupola in chilled work, due to the different effect on silicon.

Phosphoric Pig Iron.

Phosphoric iron is used almost exclusively for small, thin castings, where great fluidity is desired.

A very fluid iron is essential in thin work, as it fills every part of the mold and gives a clear, solid casting.

Iron high in phosphorus is very weak and brittle under impact (shock), consequently it cannot be used where great strength is required. With high silicon and a high graphitic carbon the phosphorus may rise to 1 per cent. in the casting, but in chilled work, with low silicon and much combined carbon, the phosphorus must be kept below 0.30 per cent.

This specification calls for an iron within the following limits, viz.:

Silicon must not be less than.....	Per cent.
(A higher silicon preferred.)	1.50
Sulphur must not exceed.....	0.055
Phosphorus should not be below.....	1.00
Manganese may range from.....	0.30 to 0.90
Total carbon should not be below.....	3.00

Any car of iron showing on analysis more than 0.06 per cent. of sulphur or less than 0.90 per cent. of phosphorus will be rejected.

REMARKS.—These specifications will be submitted whenever a purchase of pig iron is to be made, with the distinct understanding that there is to be no deviation from the figures specified.

Molding Sand.

Sand purchased under this specification must be reasonably free from stones, dirt, silt and organic matter, such as roots, decomposed vegetables, &c.

Three kinds of sand will be considered—viz., silica or fire sand, molding sand and core sand. These sands will be classed according to their chemical composition, and graded, according to the degree of fineness, into five distinct grades or numbers, as follows:

Grade.	Degree of fineness. Per cent.
No. 1.—Superfine.....	above 100
No. 2.—Fine or light.....	100 to 90
No. 3.—Medium.....	90 to 75
No. 4.—Coarse or heavy.....	75 to 55
No. 5.—Extra coarse.....	55 to 30

In specifying the fineness of sand the above numbers will be used, and will apply to silica, molding and core sand.

No sand will be accepted which varies more than 5 per cent. from the grade designated at the time of purchase.

Silica or Fire Sand.—This material is used for refractory work, tempering high bond molding sand, mixing with fire clay, for steel casting purposes and for grinding.

Good fire sand will usually run about 98 per cent. of silica, with very little alumina, lime, magnesia or combined water, and not more than a mere trace of iron.

No fire sand will be accepted which shows on analysis less than 95 per cent. of silica, more than 4 per cent. of alumina or more than 1 per cent. of lime.

The following analysis of an average fire sand will give some idea as to what is desired:

	Per cent.
Silica, SiO ₂	98.04
Alumina, Al ₂ O ₃	1.40
Iron, Fe ₂ O ₃	0.06
Lime, CaO.....	0.20
Magnesia, MgO.....	0.16
Combined water, H ₂ O.....	0.14
Specific gravity.....	2.592

Molding Sand.—Molding sand for iron work generally contains from 70 to 85 per cent. of silica, 5 to 13 per cent. of alumina, usually less than 2.50 per cent. of lime and magnesia, not over 0.75 per cent. of fixed alkali (soda and potash), generally less than 5 per cent. of iron, and seldom more than 4 per cent. of combined water.

Sand for brass molding may contain a much higher percentage of iron and lime, without doing any particular harm.

All molding sands usually contain some organic matter, generally present in the form of small roots or as decomposed vegetable matter.

We do not expect to buy a sand with an exact chemical composition, as this is almost an impossibility, the same bed of sand often varying several per cent. in silica and alumina at different places; we do, however, reserve the right to reject any sand not of the required degree of fineness, or that contains an excessive amount of carbonate of lime, magnesia, iron and organic matter. Our limit for the objectionable elements is as follows:

Carbonate of lime must not exceed 1.50 per cent. in an iron molding sand, and should not exceed 2.25 per cent. in a brass sand.

Iron must not exceed 5.50 per cent. in the iron molding sand or 7 per cent. in a brass sand.

Organic matter must not exceed 1 per cent., and preference will be given sands running lower in organic matter.

Clay and silt are objectionable, consequently any sand showing on analysis more than 13 per cent. of alumina will be rejected. (See note.)

The following analyses of molding sands will give some idea as to their chemical composition:

	Light iron work.	Medium iron work.	Heavy iron work.	Light brass work.
Silica, SiO ₂	82.21	85.85	88.40	78.86
Alumina, Al ₂ O ₃	9.48	8.27	6.30	7.89
Iron oxide, Fe ₂ O ₃	4.25	2.32	2.00	5.45
Lime oxide, CaO.....	...	0.50	0.78	0.50
Lime carbonate, CaCO ₃	0.68	0.29	...	1.46
Magnesia, MgO.....	0.32	0.81	0.50	1.18
Soda, Na ₂ O.....	0.09	0.10	...	0.13
Potash, K ₂ O.....	0.05	0.03	...	0.09
Manganese, MnO.....	...	trace	0.25	trace
Combined water, H ₂ O.....	2.64	1.68	1.73	3.80
Organic matter.....	0.28	0.15	0.04	0.64
Specific gravity.....	2.652	2.645	2.630	2.640
Degree of fineness.....	85.18	66.01	46.86	94.88

So far as the chemical composition is concerned, any one of the above sands would answer fairly well for nearly any class of work, but it is absolutely necessary that the proper degree of fineness be carefully considered.

Core Sand.—The quality or chemical composition of a core sand, according to some authorities, is of minor importance, the degree of fineness being the main feature.

As a rule, a good core sand should be high in silica and low in alumina.

The bond for core sand is obtained by adding rosin, flour, &c., consequently the desired effect is produced with a high silica sand or with a sand low in alumina and iron.

A sand low in alumina and iron will permit of the rapid escape of the gases, whereas a high alumina or a clay sand bakes and holds back the gases.

The two following analyses, though radically different, are good core sands, due entirely to low alumina and iron:

	Extra quality core sand.	Fair quality core sand.
Silica, SiO ₂	94.30	69.31
Alumina, Al ₂ O ₃	1.95	4.76
Iron oxide, Fe ₂ O ₃	0.33	1.58
Lime carbonate, CaCO ₃	1.63	3.50
Lime sulphate, CaSO ₄.....	...	8.19
Magnesia, MgO.....	0.54	7.77
Alkalies, Na ₂ O, K ₂ O.....	0.05	0.12
Combine water, H ₂ O.....	1.05	2.95
Organic matter.....	0.15	1.82

Objection will be made to core sands containing more than 5 per cent. of alumina or more than 2.50 per cent. of iron.

When a shipment of sand is received the inspector will select three samples of about 2 pounds each from different parts of the car, and these samples will be sent to the laboratory for examination.

The sand, after being thoroughly mixed by machinery, will first be weighed, then dried at a temperature of 120 degrees F. for one hour, or until perfectly free from moisture; the difference or loss in weight of the moist sand and the dry sample will represent the amount of moisture present.

The degree of fineness and the chemical analysis are to be determined by the dry sample.

The apparatus required for estimating the percentage or degree of fineness consists of a scale or balance sensitive to 1cg., or 1-10 grain, and a set of five inch United States standard brass sieves of the following mesh—viz., 100, 80, 60, 40 and 20.

These sieves are fitted with a cover and a bottom pan, and may be used separately or in combination; they may be obtained of any dealer in chemical apparatus.

METHOD OF DETERMINING THE DEGREE OF FINENESS.

Exactly 100 grams (or, if preferred, 1000 grains) is carefully weighed out and emptied into the 100-mesh sieve, which has been previously placed upon the bottom pan.

The sieve is now shaken for exactly one minute, mostly sidewise, but occasionally up and down, to free the meshes of sand; at the end of one minute the bottom pan is removed, the sand weighed that has passed through, and the weight credited to the 100-mesh sieve.

The sand remaining on the 100-mesh sieve is then emptied into the 80-mesh sieve, placed on the bottom pan as before, and the sieve just used is thoroughly cleaned with a stiff stencil brush.

The 80-mesh sieve is shaken as before for exactly one minute, and the sand which has passed through is carefully weighed and credited to the 80-mesh grade. In similar manner 60, 40 and 20 mesh sieves are used, each receiving credit respectively.

The amount of sand passing through the sieve, multiplied by the number of the mesh, and the sum of the several results divided by 100, will give the average per cent. or degree of fineness of the sample.

Usually there is a small loss, due to dust and small particles of sand remaining in the meshes.

Using a set of sieves as described above, the average mesh of the series will be 60, consequently any loss sustained should be multiplied by this figure and added to the total amount.

In case there should be some coarse material remaining on the 20-mesh sieve, it is weighed and credited to a No. 1 mesh.

The following example will more clearly illustrate the method and calculations:

Weight of sand passing through.	Number or mesh of sieve.	
55.22 grams, multiplied by 100 mesh.....		5,522.00
20.89 grams, multiplied by 80 mesh.....		1,671.20
11.64 grams, multiplied by 60 mesh.....		698.40
10.57 grams, multiplied by 40 mesh.....		422.80
1.20 grams, multiplied by 20 mesh.....		24.00
0.06 grams, multiplied by 1 mesh.....		0.06
98.58		
0.42 (loss) multiplied by 60 mesh.....		25.20
		8,363.66

8363.66 divided by 100 = 83.64 per cent., which is assumed to be the correct degree of fineness.

In case of dispute it is customary to make duplicate determinations of the degree of fineness and take the average as an absolute figure.

If the test is carefully carried out there should be very

little loss, and duplicate determinations should not vary more than 2 per cent.

NOTE.—The following remarks on the effect of certain elements in sand will give some idea as to what is desired and to what is considered objectionable.

Silica is the fire resisting element; it has no bond—i. e., binding property—consequently in a sand where adhesiveness is required alumina must be present; silica alone is very refractory, but in the presence of fluxing elements—iron, lime, magnesia, soda and potash—it readily fuses and forms silicates; these silicates fuse or melt at about the following temperatures:

	Degrees F.
Silicate of alumina melts at.....	4,350
Silicate of magnesia melts at.....	3,960
Silicate of lime melts at.....	3,810
Silicate of iron melts at.....	3,270
Silicate of soda melts at.....	1,500

When soda or potash is present silicates are formed at low temperatures.

Iron melts at 2200 to 2300 degrees F., consequently a sand containing much iron, lime and alkali will burn or fuse into the molten metal when molding, or, in other words, the more lime or alkali present the more easily the sand is converted into a slag.

Alumina is a binder, hence a sand high in alumina is said to be strong or possess "bond;" alumina is very refractory, but, unlike silica, it "bakes together" like pottery at a high temperature, consequently too much alumina must not be present in sand, otherwise the mold would be spoiled by excessive shrinkage or by the sand being non-porous.

Lime may exist in sand as oxide, hydrate, carbonate or as sulphate, occasionally in two different forms, but usually as carbonate and oxide; the carbonate is the most objectionable form, as on heating the carbonic acid gas is driven off, producing an excess of gas and reducing the original volume of sand.

Most of the lime salts are converted into oxide on burning, consequently excess of lime will cause a mold to either drop or crumble.

Iron may be present as ferrous oxide, ferric oxide, hydroxide or as ferrous carbonate, all of which are converted into ferric oxide by heat. Iron in the presence of silica, alumina, lime, magnesia, &c., has a tendency to fuse or produce a slag by reduction.

Manganese in sand acts in a similar manner to iron, but not in such an energetic manner on account of its high fusion point.

Magnesia is very similar to lime, but less harmful on account of being more refractory.

Organic matter gives bond to sand, but the bond or binding property is destroyed the moment it comes in contact with the molten metal, the organic matter being burned out; consequently there is a loss in volume and this shrinkage causes the sand to fall or crumble.

Combined water is always present in high alumina sands, and is one reason for the shrinkage in a strong bonded sand.

The sand purchased under this specification must be within the specified limits in regard to iron, lime and organic matter.

In buying sand particular attention will be paid to the degree of fineness; the sand will be designated by number and must correspond to the proper degree of fineness, thus, for example, if a No. 3 molding sand is ordered the degree of fineness must be between 75 and 90 per cent.

Specifications for Machinery Scrap.

Under this specification we desire a good, clean scrap iron, such as agricultural implement and light machinery scrap.

The scrap must contain no wrought iron, steel, stove plate, grate bars, car wheels, brake shoes, chilled roll, &c.

Malleable scrap is objectionable, also excess of oxide or rust.

Large pieces, weighing more than 400 pounds, will not be accepted.

When a car of scrap is received the inspector will superintend the unloading and discard the following objectionable scrap—viz.:

Wrought iron, steel, burnt stove plate, grate bars, car wheels, brake shoes, large chilled work, burnt malleables and large pieces weighing more than 400 pounds.

Rejected scrap will be deducted from the total weight of scrap received and payment made only on accepted material.

The City Council of Chicago is now considering the adoption of an ordinance compelling the use of 4-inch tires on all wagons carrying 3000 pounds or more. It had been expected that the ordinance would be passed to go into effect July 1, 1901, but the large firms engaged in teaming are desirous that the enforcement of the measure should be postponed to a later date, and it is now

possible that the time thus fixed may be July 1, 1902. This action is being taken in the hope that wide tires will prove less injurious to the street pavements, the narrow tires now used on heavy wagons being certainly responsible for a great deal of such damage.

Central Pennsylvania News.

HARRISBURG, PA., October 29, 1900.—A newspaper of this city, which is supporting President McKinley, in order to disprove the statements of Mr. Bryan that the country is no more prosperous now than it was four years ago and that, if there is any benefit, the working-man is not getting it, wrote to the heads of the various iron and steel manufacturers of this city requesting information as to the number of men employed and the wages paid as compared with four years ago. Frank Tenney, assistant to the president of the Pennsylvania Steel Company, writes that the number of men employed by their company during the month of September, 1896, was 3752, and the total amount of the pay roll for that month was \$127,971.27. In September, 1900, the number of men on the rolls was 6104, and the total amount of wages paid was \$243,752.23. John A. Affleck, manager of the Harrisburg Mfg. & Boiler Company, writes that they employed in October, 1896, 49 men and paid weekly wages for that month of \$409.61; in October, 1900, 104 men were employed and were paid \$844.78 a week. G. M. McCauley, general manager of the Central Iron & Steel Company, reports that in the fall of 1896 the company employed 350 men and the wages paid amounted to about \$2200 per week; for the corresponding period this year there have been employed 500 men, and the wages amount to \$4678 per week. He adds that the average during the past year has been much higher owing to the fact that the tonnage is smaller now because of the fact that the puddle mill, which was shut down in 1896, was not in operation until last year, and was run until April of this year, when it was sold to the Pennsylvania Railroad Company. He says if this puddle mill were now running ("and it would be if we had not sold it,") the wages would be increased to at least \$6000 per week, instead of \$4678, as against \$2200 in 1896. He says the company are obliged to secure the product which the puddle mill turned out from other sources, and that, in fact, the present business means \$6000 a week, as against \$2200 four years ago. James B. Bailey, president of the Chesapeake Nail Works, says: "We are not able to give you the comparative statements that you asked for, as we were not running at all during the fall of 1896. We have been running fairly steadily from January 1, 1897, up to the present time and fully expect that we shall have continuous work if McKinley is elected in November." R. C. Neal, president of the Harrisburg Rolling Mill Company, says that in August, 1896, his company paid out in wages the sum of \$6908.18, and in August, 1900, \$12,878.74. In September, 1896, the pay roll was \$5368.33, and in September, 1900, it was \$11,658.34. This is considered a very favorable showing for the industrial concerns of this city, and managers of other plants here say the figures of their companies make about the same showing.

There was a very heavy output in all the departments of the Pennsylvania Steel Company during the past week.

The Raymond Mfg. Company of Middletown, whose foundry was recently destroyed by fire, have commenced the erection of new buildings. This addition to the plant will equip the company for heavier work. The company have been very busy for a long time and have many orders ahead.

Among late orders booked by the Harrisburg Foundry & Machine Company are the following: One 275 horse-power Harrisburg standard engine for the Frank-Kneeland Machine Company, Pittsburgh; one 100 horse-power and one 150 horse-power engine for Hochschild, Kohn & Co., Baltimore; one 125 horse-power engine for Webster, Camp & Lane Machine Company, Akron, Ohio; two 150 horse-power engines for export to Sydney, N. S. W., and one 60 horse-power engine for League Island Navy Yard.

The Central Pattern Works at Middletown, which have been operated by J. W. Kline & Son for many years, have been purchased by George M. Kline, the junior member of the firm, who will operate them in the future.

The Lalance-Grosjean Mfg. Company (tin plate) are running all the mills here full time, and there is understood to be some prospect of a further increase in the capacity of the plant by the erection of additional mills, which will make the company almost independent of other concerns in the turning out of their product.

There has been a reduction of wages of puddlers at the Altoona Iron Works from \$4.25 to \$3 per ton, to take effect November 1. The wages of the muck roll men

will also be reduced at the same time. The decline in the price of bar iron is given as the reason for the cut. About 50 men are affected.

The Harrisburg Pipe & Pipe Bending Company are at work on a large order for coils from San Francisco. This company start into the pipe making branch of the business with a fine prospect for big business.

There is apparently a revival in the pipe trade, the big plant of the National Tube Company running with a fair degree of regularity. s.

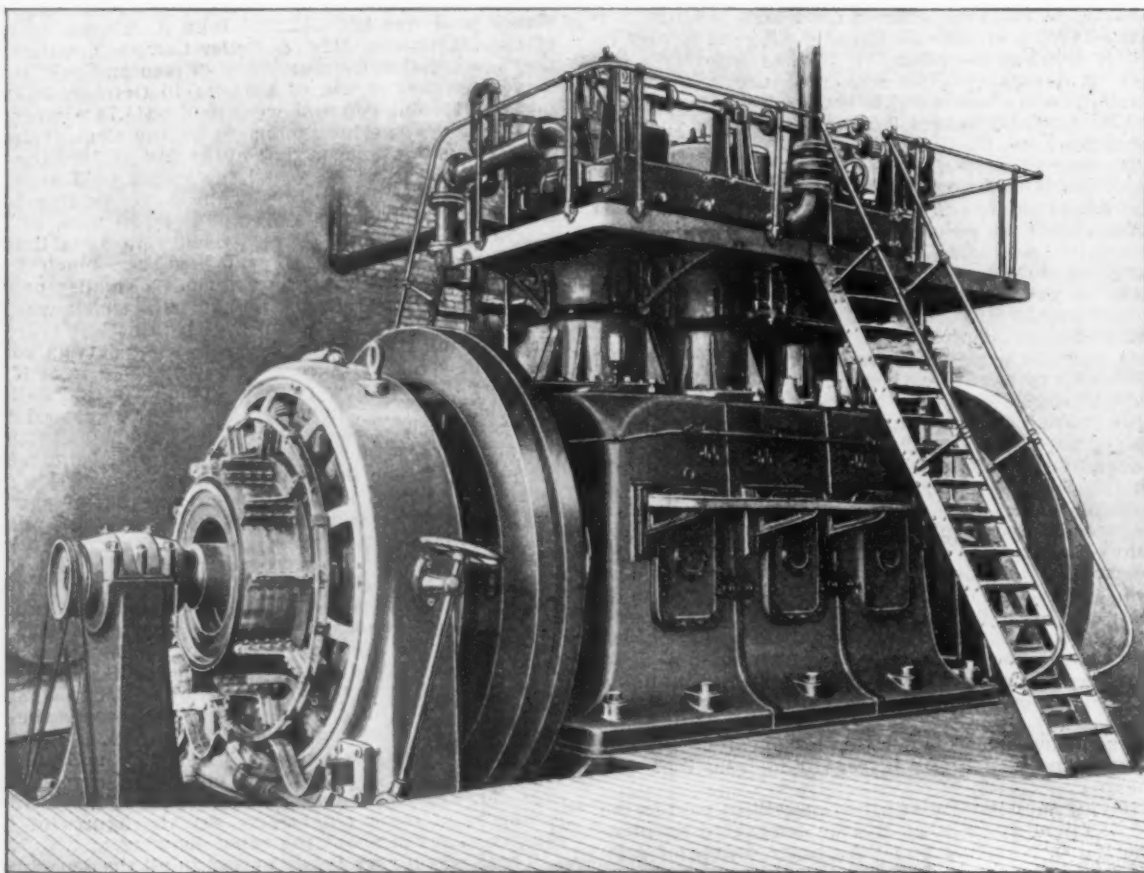
A Large Gas Engine and Electric Power Plant.

An unusually large gas engine and electric power plant has been recently installed by Westinghouse, Church, Kerr & Co. at the Howard Axle Works, one of the Carnegie interests at Homestead, Pa. The illustrations of the plant help to demonstrate that the steam engine is no longer alone as a source of mechanical

fly wheel, such as is used in steam engine practice, being secured to the shaft at each end of the engine. The relatively slow speed of 150 revolutions per minute is attained. There are three cylinders, in each of which ignition occurs once in every two revolutions, and the cranks are set at such an angle that the crank shaft receives an impulse once in every two-thirds of a revolution.

The direct connected generator is of 400 kw. capacity, giving 1600 amperes at 250 volts. The voltage regulation is such as to substantiate fully the claim made for the perfected gas engine that it is capable of as close regulation as the best steam engine.

From the generator the current is led to a switchboard of the usual engine room type. This comprises two generator panels—one for the gas driven generator and the other for a second (steam driven) generator of equal capacity, to which we shall refer later; one panel for the main or station ammeters; five panels for the motors in the boiler house and the works, where they are used for operating conveyors, cranes, blowers, axle lathes, axle straightening and centering machines, axle



A LARGE GAS ENGINE AND ELECTRIC POWER PLANT.

power. Gradually the defects and limitations of former gas engine design have given way before intelligent engineering methods. It is too soon to forecast the future of this new source of power, but at least it is safe to say that the future general adoption of the gas engine seems to-day a far more reasonable proposition than the prophecy that the electric motor would take first place in mill and factory power service seemed ten years ago.

At the Howard Axle Works, as shown in Fig. 1, is a 650 horse-power Westinghouse gas engine direct connected to an engine type Westinghouse generator, giving direct current at 250 volts. Natural gas is supplied from the Carnegie Steel Company's 6-inch mains, being piped to the engine room from the adjacent street. Pressure in the gas mains varies from 2 to 4 pounds to the square inch, and this, as the pipes enter the building, is brought down to 8 ounces by means of a reducing valve, and is again reduced to atmospheric pressure at the inlet to the engine by a second reducing valve.

The engine runs smoothly, with almost no noise, and no odor can be detected. The cylinders are water jacketed and the engine is not appreciably hotter than a high pressure steam engine of corresponding dimensions.

The Westinghouse method of regulation causes the engine to run with absolute steadiness, a moderate sized

testing apparatus, and carpenter and machine shop equipments. One panel is also provided for arc and incandescent lights. In addition to these there are two large separate switches by means of which the two generators may be connected direct to each other, thus equalizing their load. Either engine and generator set, however, is at present sufficient for operating the machinery of the works. There are two generators, identical in size, capacity and voltage. The second generator is driven by a direct connected horizontal compound tandem engine made by the Buckeye Engine Company.

It will be difficult to find a more striking engineering contrast than the one afforded by these two sets. The steam engine represents up to date practice in its special field. The gas engine, on the other hand, although it is the result of many years of experience in engine building, and shows sound conservative mechanical design, is none the less a wonder and an innovation. Back of the steam engine the visitor knows there is a line of boilers, with all the paraphernalia of the boiler house, and the coal shed. Back of the gas engine is only a pipe connection to a street main. The floor space occupied by the gas engine measures only 29 x 11 feet, but, aside from this, there are two small and approximately equal areas occupied respectively by the switchboard and the gas driven air compressing set for starting the big gas engine.

The floor space taken up by the steam engine and the generator driven by it is almost the same as that devoted to the gas engine and generator, but the coal and boiler room area called for by the former set is, of course, many times larger.

As already noted, the three gas engine cylinders are water jacketed. Water from the mains is supplied to them, the amount required being approximately 4 to 5 gallons per horse-power hour. The water discharged from the jacket circulating system is at a temperature of between 100 and 200 degrees F., and may be utilized in a variety of ways. In some instances it is supplied to the feed water heaters of a boiler plant; in others it is used even for heating a building. If the water supply is very limited it is practicable to run the water through a cooling tower and use it over and over again.

It might be objected by any one unfamiliar with the operation of gas engines that the heat thus thrown off must represent a large percentage of waste. This—if the water is indeed allowed to flow to drain—is true; but the thermal efficiency of a high grade gas engine is so great that even with this waste a brake horse-power is obtained with less than half the quantity of coal required per brake horse-power in a high grade steam en-

steam hammers, as required. The switches are operated by hydraulic power, and are controlled from a central elevated platform in charge of a switchman. In these steam hammers the axles are forged roughly to general dimensions, and from them they are carried on elevated tracks and by overhead cranes to storage racks and straightening machines, each of the latter being driven by a 10 horse-power motor.

The axles are next rolled on elevated tracks, or carried by cranes, to electrically driven centering and cut off machines and finishing lathes. After this the axles are severely hammered in a testing machine, which is also operated by an electric motor. The axles have now passed through the entire length of the machine shop with very little hand labor, and are ready for shipment.

Electric motors are used at the Axle Works for a wide variety of minor purposes, including the operation of a carpenter shop, a machine shop for the repair of tools and apparatus, and a boiler house crane with coal and ash handling machinery. The total horse-power of the motors installed is considerably in excess of the horse-power of either generator, as it is found in practice that some motors are always out of use or running at light load at a given moment. To so great an extent

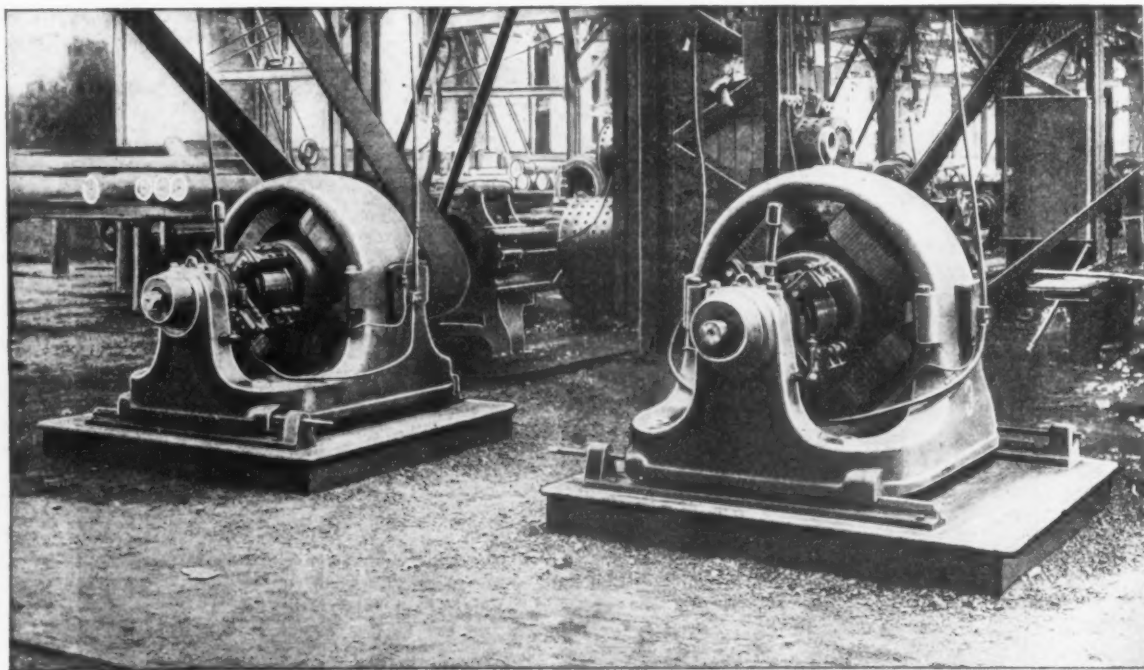


Fig. 2.—View Showing Arrangement of Motors.

A LARGE GAS ENGINE AND ELECTRIC POWER PLANT.

gine plant. This we believe to be a well established fact and one that is well worth being borne in mind by works managers, especially if their coal supply is in the hundreds of tons per week.

Twenty-eight Westinghouse motors are at present used in the Howard Axle Works, in sizes ranging from 50 horse-power down. The workmen have received suitable instructions in the care of electric machinery, and it is worthy of note that, although the plant has been in operation for several months, not a single mishap to a motor has been reported. In nearly every instance one motor of fair size is used to operate a group of lathes or other machines, in place of individual motors. Fig. 2 shows two 40 horse-power motors, each belted to a group of axle lathes, while Fig. 3 shows a 50 horse-power motor driving one of the Buffalo Forge Company's furnace blowers at 900 revolutions per minute.

The manufacture of railroad car axles affords an excellent illustration of the applicability of the electric motor to general machine shop uses. The steel billets from which the car axles are forged are delivered by rail at the axle works. An overhead electric crane takes them to an electric conveyor by which they are fed to the furnaces automatically. When a suitable temperature has been reached the billets are fed from the furnace into a set of roughing rolls operated by a direct connected horizontal engine. From this they are run directly onto a conveyor which runs down the center of the hammer shop, and which is driven by a motor installed in a pit under the floor of the shop. From this conveyor the hot billets are switched off to the different

does this hold true that in addition to these motors either generator will take care of 75 arc and about 150 incandescent lamps.

This gas engine installation is as yet too new to have furnished final data as to performance, but similarly equipped Westinghouse gas engines have been found to possess an efficiency of from 25 to nearly 30 per cent.—that is to say, such is the ratio between the heat equivalent of their mechanical output and the heat value of the fuel supply. The longest continuous run under load thus far made with this particular engine was of 260 hours' duration, which is very nearly as severe usage as that to which the engines of an Atlantic liner are subjected; and there is no reason to believe that far longer runs are in any way impracticable. The gas engine is by no means to-day the delicate and complex piece of mechanism that it was ten years ago. The Westinghouse gas engines embody many of the structural characteristics of the steam engines of the same name. Exteriorly they closely resemble the latter, while cylinders, pistons and piston rods, shafts and bearings are all designed after their long tried prototypes in the steam engine.

The igniting device, which has hitherto been one of the weakest points in gas engine design, is, in the Westinghouse engine, of strong construction and is positive in action. Another conspicuous feature of the Westinghouse gas engine is the speed regulating mechanism. In the earlier designs of gas engines crude regulation was obtained by the "hit and miss" method of governing, by which one or more ignitions were omitted when-

ever the speed rose above a predetermined point. Such a method, of course, could give only a rough regulation. It was practically out of the question for electric power purposes. In the Westinghouse engine, however, speed is regulated by admitting the charges of gas without omissions, but automatically varying the quantity of explosive mixture admitted in accordance with the load.

The Gruson Plant.

CHESTER, PA., October 30, 1900.—The Gruson Iron Works, after several months of preparation on their plans, commenced operations last week on their new industry to be located at Eddystone, Pa. They are building an addition to the office, which has been found inadequate for their purpose, a foundry 122 feet wide by 198 feet long, a machine shop 122 x 108 feet, a pattern shop 40 x 75 feet, and a boiler and engine house 40 x 90 feet,

York and Portland, and is to be ready to go on the line about July 10, 1901. The plans call for a triple expansion engine, with cylinders 36, 48 and 75 inches in diameter, and 56-inch stroke, to develop 4000 horse-power and drive the ship 17 knots an hour. The passenger accommodations will be of the finest character, and there will be about 150 staterooms, each room having an outside window. The interior decorations will be in white and gold, with mahogany trimming, and she will be one of the fastest and finest coasting steamers ever constructed in this country.

The *Iron and Coal Trades Review* reports that a curious condition of affairs in the axle trade is revealed by some facts that have recently come to light with reference to a large order which has just been placed for wheels and axles for the Burma railways. Tenders were asked for the complete wheels and axles under the usual specification of that railway. The prices sent in

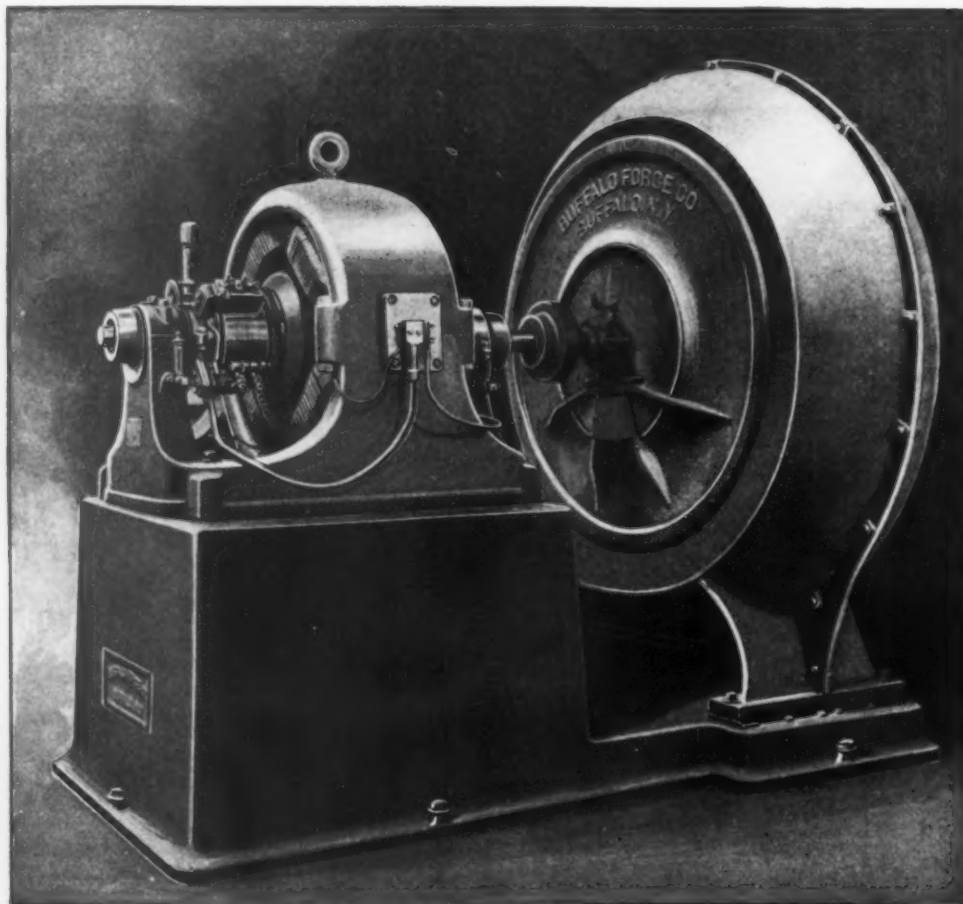


Fig. 3.—Fifty Horse-Power Motor Driving Blower.

A LARGE GAS ENGINE AND ELECTRIC POWER PLANT.

with other small buildings. The contracts have been divided among several bidders. The Structural Iron & Steel Company of Baltimore, Md., are furnishing all of the structural steel work. The railroad sidings into the plant are about completed, making in all nearly 4000 feet, giving facilities and connections with both the P. W. & B. and the P. & R. railroads, and as the property has a splendid river front, it is the intention of the Gruson Company to build large docking and shipping facilities, but they do not contemplate their erection at the present time.

David Townsend, mechanical and consulting engineer, also one of the board of directors, says in an interview: "We expect to have our works up and under cover before the first of the year 1901, and as soon after that as our machinery can be placed we will start business."

The Maine Steamship Company have given Roach's shipyard, at Chester, Pa., an order to build a large passenger and freight steamship. The new steamer will be about 321 feet in length over all, 46 feet breadth of beam and 17 feet 6 inches depth of hold, with a gross tonnage of about 3300. She is intended for service on the popular line of the Maine Steamship Company, between New

by the English axle makers were, however, so high as to be impossible, and inquiries were sent to American makers, one of whom, the Carnegie Company, sent in a quotation so much below the English competitors that it was ultimately accepted. Now the Carnegie Company did not offer to furnish axles in accordance with the original specification, but it appears to have been quite optional for the English makers to tender for axles under any modified specification if they so desired, and could have then tendered more cheaply. This they neglected to do, but the American axle makers, with perhaps a keener eye to business, sent in alternative tenders, and took the order. This course had indeed been previously suggested to at least one English maker, and his reply was that he did not make two qualities of axles. It may be added that the Carnegie tests and specification were those of the Pennsylvania Railway, the highest standard in the United States. As the preference would certainly have been given to English makers, even if their prices were in any way comparable, it is to be hoped that this lesson will not be lost, and that our home makers will not allow themselves to be elbowed out of a field which is peculiarly their own by the closer figuring and more adaptable business methods of the Americans.

The International Association for Testing Materials.

A small but select gathering of experts constituted the meeting of the American section of the International Association for Testing Materials, which held its sessions at the house of the American Society of Mechanical Engineers on October 25, 26 and 27. There were present at the meeting:

H. M. Howe, professor of metallurgy, Columbia University.
Dr. Dudley, Pennsylvania Railroad, Altoona, Pa.
H. H. Campbell, superintendent Pennsylvania Steel Company, Steelton, Pa.
W. R. Webster, engineer of tests, Philadelphia.
C. Edward Stafford, Illinois Steel Company, Chicago, Ill.
C. L. Huston, vice-president Lukens Iron & Steel Company, Coatesville, Pa.
G. E. Thackray, Cambria Steel Company, Johnstown, Pa.
John McLeod, assistant to the president, Carnegie Steel Company.
Capt. Lewis T. Brown, manager Union Mills, Carnegie Steel Company, Pittsburgh, Pa.
P. E. Carhart, inspecting and testing engineer, Illinois Steel Company.
A. L. Colby, metallurgical engineer, Bethlehem Steel Company, South Bethlehem, Pa.
H. D. Witte, engineer of tests, Baldwin Locomotive Works, Philadelphia.
S. T. Wagner, first assistant engineer, city of Philadelphia.
Max H. Wickhorst, engineer of tests, Chicago, Burlington & Quincy Railroad.
Professor Merriman, Lehigh University.
Paul Kreutzpointner, Pennsylvania Railroad, Altoona, Pa.

The first session, on Thursday afternoon, was given over to routine business and to the election of officers, which resulted in the following: H. M. Howe, chairman; Dr. Dudley, vice-chairman; R. W. Leslie, treasurer; J. M. Porter, secretary. Professor Howe was elected nominee of the American section for member of the International Council.

The first evening session assumed the character of rather a general discussion without any specific results. A. L. Colby reported upon his presentation before a number of European scientific and technical bodies of the proposed standard specifications, and noted that generally speaking the foreign engineers regarded them as rather too severe in their requirements. Some discussion was had on the general subject of the principle followed of specifying the process of manufacture, Mr. Stafford urging that as regular and uniform material of high quality could be secured from the Bessemer converter as from the open hearth furnace.

Some strong statements were made concerning the unreliability of the method of determining the yield point by the drop of the beam, and a strong plea was made by Paul Kreutzpointner and others for the use of dividers. It was pointed out that at times a number of drops of the beam are observed up to six, and that the results obtained at different places and with different machines do not give comparable results.

On Friday morning the meeting settled down to work, taking up first the proposed standard specifications for steel rails. These contain the following provisions:

Steel Rail Specifications.

PROCESS OF MANUFACTURE.

1. a. Steel may be made by the Bessemer or open hearth process.
- b. The entire process of manufacture and testing shall be in accordance with the best standard current practice, and special care shall be taken to conform to the following instructions.
- c. Ingots shall be kept in a vertical position in pit heating furnaces.
- d. No bled ingots shall be used.
- e. Sufficient material shall be discarded from the top of the ingots to insure sound rails.

CHEMICAL PROPERTIES.

2. Rails of the various weights per yard specified below shall conform to the following limits in chemical composition:

	50 to 59 + pounds. Per cent.	60 to 69 + pounds. Per cent.	70 to 79 + pounds. Per cent.	80 to 89 + pounds. Per cent.	90 to 100 pounds. Per cent.
Carbon.....	0.35 to 0.45	0.38 to 0.48	0.40 to 1.00	0.43 to 0.53	0.45 to 0.55
Phosphorus shall not ex- ceed.....	0.10	0.10	0.10	0.10	0.10
Silicon shall not exceed...	0.30	0.30	0.30	0.30	0.30
Manganese....	0.70 to 1.00	0.70 to 1.00	0.75 to 1.05	0.80 to 1.10	0.80 to 1.10

PHYSICAL PROPERTIES.

3. One drop test shall be made on a piece of rail not more than 6 feet long, selected from every fifth blow of steel. The rail shall be placed head upward on the supports and the various sections shall be subjected to the following impact tests:

Weight of rail. Pounds per yard.	Height of drop. Feet.
45 to and including 55.....	15
More than 55 to and including 65.....	16
More than 65 to and including 75.....	17
More than 75 to and including 85.....	18
More than 85 to and including 100.....	19

If any rail break when subjected to the drop test two additional tests will be made of other rails from the same blow of steel, and if either of these latter tests fail all the rails of the blow which they represent will be rejected, but if both of these additional test pieces meet the requirements all the rails of the blow which they represent will be accepted. If the rails from the tested blow shall be rejected for failure to meet the requirements of the drop test as above specified two other rails will be subjected to the same tests, one from the blow next preceding and one from the blow next succeeding the rejected blow. In case the first test taken from the preceding or succeeding blow shall fail two additional tests shall be taken from the same blow of steel, the acceptance or rejection of which shall also be determined as specified above, and if the rails of the preceding or succeeding blow shall be rejected similar tests may be taken from the previous or following blows, as the case may be, until the entire group of five blows is tested, if necessary.

The acceptance or rejection of all the rails from any blow will depend upon the result of the tests thereof.

TEST PIECES AND METHODS OF TESTING.

4. The drop test machine shall have a tup of 2000 pounds weight, the striking face of which shall have a radius of not more than 5 inches, and the test rail shall be placed head upward on solid supports 3 feet apart. The anvil block shall weigh at least 20,000 pounds, and the supports shall be a part of, or firmly secured to, the anvil.

5. The manufacturer shall furnish the inspector, daily, with carbon determinations of each blow, and a complete chemical analysis every 24 hours, representing the average of the other elements contained in the steel. These analyses shall be made on drillings taken from a small test ingot.

FINISH.

6. Unless otherwise specified, the section of rail shall be the American standard, recommended by the American Society of Civil Engineers, and shall conform as accurately as possible to the templet furnished by the railroad company, consistent with paragraph No. 7, relative to specified weight. A variation in height of 1-64 inch less and 1-32 inch greater than the specified height will be permitted. A perfect fit of the splice bars, however, shall be maintained at all times.

7. The weight of the rails shall be maintained as nearly as possible, after complying with paragraph No. 6, to that specified in contract. A variation of one-half of 1 per cent for an entire order will be allowed. Rails shall be accepted and paid for according to actual weights.

8. The standard length of rails shall be 30 feet. Ten per cent. of the entire order will be accepted in shorter lengths, varying by even feet down to 24 feet. A variation of 1/4 inch in length from that specified will be allowed.

9. Circular holes for splice bars shall be drilled in accordance with the specifications of the purchaser. The holes shall accurately conform to the drawing and dimensions furnished in every respect, and must be free from burrs.

10. Rails shall be straightened while cold, smooth on head, sawed square at ends, and, prior to shipment, shall have the burr occasioned by the saw cutting removed and the ends made clean. No. 1 rails shall be free from injurious defects and flaws of all kinds.

BRANDING.

11. The name of the maker, the month and year of manufacture, shall be rolled in raised letters on the side of the web, and the number of the blow shall be stamped on each rail.

INSPECTION.

12. The inspector representing the purchaser shall have all reasonable facilities afforded to him by the manufacturer to satisfy him that the finished material is furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacture prior to shipment.

13. Rails that possess any injurious physical defects, or which for any other cause are not suitable for first quality of No. 1 rails, shall be considered as No. 2 rails, provided, however, that rails which contain any physical defects which seriously impair their strength shall be rejected. The ends of all No. 2 rails shall be painted in order to distinguish them.

In the discussion Dr. Dudley of Altoona dwelt upon the necessity of making provision for the character of

the support of the anvil block in the drop test. He pointed out that it makes a considerable difference in the results obtained whether the ground upon which the block rests is soft or is hard, and whether it goes below or does not go below the frost in the foundation. He referred to the system recently adopted in the case of drop tests of steel axles in which the anvil block is mounted on springs, thus making the conditions of tests uniform at all times. Professor Merriman called attention to the absence of any measure of ductility in the rail specifications proposed. Dr. Dudley presented a motion to embody some measure of deflection under the first blow in the specifications. This motion, however, was lost, Mr. Thackray having made the point that the deflection must necessarily be largely a function of each individual section.

Dr. Dudley protested against taking borings for analysis from the test ingot on the ground that the ladle analysis did not protect the consumer against the dangerous effect of segregation. He quoted his experience that axles which had been made from the top end of ingots had shown marked segregation. Now the borings for analysis are taken from the axles themselves at a certain distance from the surface. He made a plea that the borings for analysis be taken from the rail itself. Mr. Campbell propounded the question from what point the drillings ought to be taken, since it depends largely upon the section at what part the segregation manifests itself most. Mr. Huston made the point that generally speaking ladle tests give results rather worse than the average. Mr. Stafford urged that after all analyses were really useful only as a check upon the regularity of the mill work, and that otherwise the consumer must depend principally upon the result of the drop tests.

A proposal made to allow the consumer the right to make a complete analysis of samples taken from the finished product was not favorably considered, but the question arose what was to be done if the result thereof did not prove satisfactory. Dr. Dudley stated that in the case of car specifications it has in recent years become a question for adjudication and a diminution of costs to the consumer. Thus if the same principle were applied to rails which had satisfactorily passed the drop tests but failed to prove satisfactory so far as the average analysis was concerned the consumer would have the right to accept the rails but might demand a reduction in the price. William R. Webster incidentally brought up the point that an excellent method of checking brittleness due to finishing rails at too high a temperature would be to limit the amount of shrinkage in the rails from the final rolling to the normal temperature. The rail specifications after this discussion were, however, passed as presented by the committee.

A call was made for reports from a number of other committees, including Committee No. 3, on the Behavior of Soft Steel at Low Temperatures; No. 4, Methods of Testing Welds and Weldability; No. 5, Standard Rules for Piece Tests, with Special Reference to Axles, Springs, &c., and No. 6, Method for Polishing and Etching for the Microscopic Study of Iron and Steel. None of these committees, however, were ready to do more than report progress.

The next subject taken up was that of

Standard Specifications of Splice Bars.

PROCESS OF MANUFACTURE.

1. Steel for splice bars may be made by the Bessemer or open hearth process.

CHEMICAL PROPERTIES.

2. Steel for splice bars shall conform to the following limits in chemical composition:

	Per cent.
Carbon shall not exceed.....	0.15
Phosphorus shall not exceed.....	0.10
Manganese	0.30 to 0.60

PHYSICAL PROPERTIES.

3. Splice bar steel shall conform to the following physical qualities:

Tensile strength, pounds per square inch.....	54,000 to 64,000
Yield point, pounds per square inch.....	32,000
Elongation, per cent., in 8 inches shall not be less than.....	25

4. a. A test specimen cut from the head of the splice bar shall bend 180 degrees flat on itself without fracture on the outside of the bent portion.

b. If preferred the bending tests may be made on an unpunched splice bar, which, if necessary, shall be first flattened, and shall then be bent 180 degrees flat on itself without fracture on the outside of the bent portion.

TEST PIECES AND METHODS OF TESTING.

5. A test specimen of 8-inch gauged length, cut from the head of the splice bar, shall be used to determine the physical properties specified in paragraph No. 3.

6. One tensile test specimen shall be taken from the

rolled splice bars of each blow or melt, but in case this develops flaws, or breaks outside of the middle third of its gauged length, it may be discarded and another test specimen substituted therefor.

7. One test specimen cut from the head of the splice bar shall be taken from a rolled bar of each blow or melt, or if preferred the bending test may be made on an unpunched splice bar, which, if necessary, shall be flattened before testing. The bending test may be made by pressure or by blows.

8. For the purposes of this specification, the yield point shall be determined by the careful observation of the drop of the beam or halt in the gauge of the testing machine.

9. In order to determine if the material conforms to the chemical limitations prescribed in paragraph No. 2 herein, analysis shall be made of drillings taken from a small test ingot.

FINISH.

10. All splice bars shall be smoothly rolled and true to templet. The bars shall be sheared accurately to length and free from fins or cracks, and shall perfectly fit the rails for which they are intended. The punching and notching shall accurately conform in every respect to the drawing and dimensions furnished.

BRANDING.

11. The name of the maker and the year of manufacture shall be rolled in raised letters on the side of the splice bar.

INSPECTION.

12. The inspector representing the purchaser shall have all reasonable facilities afforded to him by the manufacturer to satisfy him that the finished material is furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacture prior to shipment.

The discussion was rather brief, Dr. Dudley calling attention to the frequent breakages observed lately in the case of splice bars. These breakages begin at the top end or head of the rail and progress downward, and the engineers of the Pennsylvania Railroad have gone into figuring the fibrous stress under the peculiar conditions to which splice bars are subject, and have found that the fibrous stress amounts to 33,000 pounds. There is strong tendency as the result of observations made toward the use of high carbon steel for this particular purpose.

On Friday afternoon the committee took up the question of

Standard Specifications for Structural Steel for Buildings.

PROCESS OF MANUFACTURE.

1. Steel may be made by either the open hearth or Bessemer process.

CHEMICAL PROPERTIES.

2. Each of the two classes of structural steel for buildings shall not contain more than 0.10 per cent. of phosphorus.

PHYSICAL PROPERTIES.

3. There shall be two classes of structural steel for buildings—namely, rivet steel and medium steel, which shall conform to the following physical qualities:

	Rivet steel.	Medium steel.
Tensile strength, pounds per square inch.....	50,000 to 60,000	60,000 to 70,000
Yield point, in pounds per square inch, shall not be less than	30,000	35,000
Elongation, per cent. in eight inches, shall not be less than	26	22

5. For material less than 5-16 inch and more than ¾ inch in thickness, the following modifications shall be made in the requirements for elongation:

a. For each increase of ¼ inch in thickness above ¾ inch a deduction of 1 per cent. shall be made from the specified elongation.

b. For each decrease of 1-16 inch in thickness below 5-16 inch a deduction of 2½ per cent. shall be made from the specified elongation.

c. For pins the required elongation shall be 5 per cent. less than that specified in paragraph No. 4, as determined on a test specimen the center of which shall be 1 inch from the surface.

6. The two classes of structural steel for buildings shall conform to the following bending tests; and for this purpose the test specimen shall be 1½ inches wide, if possible, and for all material ¾ inch or less in thickness the test specimen shall be of the same thickness as that of the finished material from which it is cut, but for material more than ¾ inch thick the bending test specimen may be ½ inch thick:

Rivet round shall be tested of full size as rolled.

d. Rivet steel shall bend cold 180 degrees flat on itself without fracture on the outside of the bent portion.

e. Medium steel shall bend cold 180 degrees around a diameter equal to the thickness of the specimen tested, without fracture on the outside of the bent portion.

TEST PIECES AND METHODS OF TESTING.

7. The standard test specimen of 8-inch gauged length shall be used to determine the physical properties specified in paragraphs Nos. 4 and 5. The standard shape of the test specimen for sheared plates shall be as shown by the sketch accompanying the specification.

For other material the test specimen may be the same as for sheared plates or it may be planed or turned parallel throughout its entire length; and in all cases where possible two opposite sides of the test specimen shall be the rolled surfaces. Rivet rounds and small rolled bars shall be tested of full size as rolled.

8. One tensile test specimen shall be taken from the finished material of each melt or blow, but in case this develops flaws, or breaks outside of the middle third of its gauged length, it may be discarded and another test specimen substituted therefor.

9. One test specimen for bending shall be taken from the finished material of each melt or blow as it comes from the rolls, and for material $\frac{3}{4}$ inch and less in thickness this specimen shall have the natural rolled surface on two opposite sides. The bending test specimen shall be $1\frac{1}{2}$ inches wide, if possible, and for material more than $\frac{3}{4}$ inch thick the bending test specimen may be $\frac{1}{2}$ inch thick.

Rivet rounds shall be tested of full size as rolled.

f. The bending test may be made by pressure or by blows.

10. Material which is to be used without annealing or further treatment shall be tested for tensile strength in the condition in which it comes from the rolls. For material which is to be annealed or otherwise treated before use a full sized section of tensile test specimen length shall be similarly treated before cutting the tensile test specimen therefrom.

11. For the purposes of this specification, the yield point shall be determined by the careful observation of the drop of the beam or halt in the gauge of the testing machine.

12. In order to determine if the material conforms to the chemical limitations prescribed in paragraph No. 2 herein, analysis shall be made of drillings taken from a small test ingot.

VARIATION IN WEIGHT.

13. The variation in cross section or weight of more than $2\frac{1}{2}$ per cent. from that specified will be sufficient cause for rejection, except in the case of sheared plates, which will be covered by the following permissible variations:

g. Plates $12\frac{1}{2}$ pounds per square foot or heavier, when ordered to weight, shall not average more than $2\frac{1}{2}$ per cent. variation above or $2\frac{1}{2}$ per cent. below the theoretical weight.

h. Plates under $12\frac{1}{2}$ pounds per square foot, when ordered to weight, shall not average a greater variation than the following:

Up to 75 inches wide, $2\frac{1}{2}$ per cent. above or $2\frac{1}{2}$ per cent. below the theoretical weight.
Seventy-five inches and over, 5 per cent. above or 5 per cent. below the theoretical weight.

i. For all plates ordered to gauge, there will be permitted an average excess of weight over that corresponding to the dimensions on the order equal in amount to that specified in the following table:

Table of Allowances for Overweight for Rectangular Plates when Ordered to Gauge.

The weight of 1 cubic inch of rolled steel is assumed to be 0.2833 pound.

Thickness of plate.—Inch.	Plates $\frac{1}{4}$ inch and over in thickness.		
	Width of plate.		
	Up to 75 inches.	75 to 100 inches.	Over 100 inches.
	Per cent.	Per cent.	Per cent.
$\frac{1}{4}$	10	14	18
$\frac{5}{16}$	8	12	16
$\frac{3}{8}$	7	10	13
$\frac{7}{16}$	6	8	10
$\frac{1}{2}$	5	7	9
$\frac{5}{8}$	4 $\frac{1}{2}$	6 $\frac{1}{2}$	8 $\frac{1}{2}$
$\frac{3}{4}$	4	6	8
over $\frac{3}{4}$	3 $\frac{1}{2}$	5	6 $\frac{1}{2}$

Thickness of plate. Inch.	Plates under $\frac{1}{4}$ inch in thickness.	
	Width of plate.	
	Up to 50 inches.	50 inches and above.
	Per cent.	Per cent.
$\frac{1}{8}$ up to $\frac{1}{16}$	10	15
$\frac{1}{16}$ up to $\frac{1}{32}$	8 $\frac{1}{2}$	12 $\frac{1}{2}$
$\frac{1}{32}$ up to $\frac{1}{64}$	7	10

FINISH.

14. Finished material must be free from injurious seams, flaws or cracks and have a workmanlike finish.

BRANDING.

15. Every finished piece of steel shall be stamped with the melt or blow number, except that small pieces may be shipped in bundles securely wired together, with the melt or blow number on a metal tag attached.

INSPECTION.

16. The inspector representing the purchaser shall have all reasonable facilities afforded to him by the manufacturer to satisfy him that the finished material is furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacture prior to shipment.

Professor Merriman raised the question why there was introduced a classification which is not consistent in its nomenclature, one grade of steel being designated as "rivet steel," while the other is alluded to as "medium steel." Mr. Stafford made a plea in behalf of a modification of the figure for the yield point, which he regarded as too high. On motion it was agreed to change the figures from those given in the specification above so as to make it read "not less than one-half of the ultimate strength."

After discussion by Mr. Huston paragraph 5 of the specifications was adopted.

In the discussion of paragraph 6 Mr. Kreutzpointner advocated the planing of the edges of bending tests, but it was decided to make this modification in a later paragraph.

Nos. 7 and 8 were adopted after some discussion, while to No. 9 was added the provision that "All sheared edges of all bending specimens may be milled or planed."

At the suggestion of Mr. Huston there was added to paragraph 10 the following: "When it is impracticable to secure a test specimen after annealing."

Paragraph 11 was adopted, while a suggestion to amend paragraph 12 was lost. This suggestion was to the effect that it be agreed that borings taken from any part of the finished material shall not exceed 0.10 phosphorus. The proposer had intended this amendment to guard against segregation. At the suggestion of Mr. Stafford there was added to paragraph 13 the following: "Plates shall be considered to be to gauge if measuring not less than 1-100 under gauge."

Previous to taking up the question of the proposed specification for bridge material there was read the following letter to W. R. Webster from R. S. Buck, engineer, in charge of bridges Nos. 3 and 4 of the Department of Bridges of the City of New York:

Will you kindly submit the following to your committee for discussion with other matters pertaining to steel specifications that will come up at your October meeting:

There is a difference of opinion among those interested in the manufacture and use of steel for bridge purposes as to what requirements should be embodied in the specifications for this material. This difference of opinion has at times manifested itself in open controversy and litigation.

In preparing the specifications for the proposed East River bridges Nos. 3 and 4, it is desired to secure a quality of steel which will give the broadest latitude to the manufacturer, and admit of the widest competition practicable with the certainty of obtaining the high and uniform class of material required.

We therefore take the liberty of asking from you, as an expert in the manufacture and use of steel, an expression of your opinion on certain essential points, to aid us in reaching a decision equitable alike to the consumer and producer, according to the preponderance of all proper considerations.

We would adopt all necessary precautions in the selection of the stock and in the manufacture of the steel to insure a uniform and reliable product of the most suitable quality for the purpose. We would expect this steel to be more carefully made than the ordinary run of bridge material, as well as stronger and more reliable, and would therefore expect to pay a somewhat higher price for it, but we do not wish to carry refinements beyond the point where we cease to receive full value for the additional price to be paid.

Bridge No. 3 is to be a suspension bridge, and Bridge No. 4 a cantilever. In different parts of the structures the dead load stresses will vary from one to four and a half times the live load stresses. They will be designed for heavy city service, but not for railroad service.

Queries.

A. What chemical requirements should be imposed in the case of steel for plates and shapes?

a. For acid open hearth steel?

b. For basic open hearth steel?

B. Same for eye bar material?

C. Should acid steel be required exclusively in either or both of the cases A and B?

D. What is the highest carbon steel, defined by percentage of carbon and by ultimate strength and elastic limit, that can properly be used in truss members in the form of plates and shapes? In this case assume that all holes will be drilled throughout.

E. What is the highest carbon steel, defined as before, that can be properly used in eye bars?

F. Can steel of 72,000 to 80,000 pounds ultimate strength, and 40,000 pounds minimum elastic limit, be properly adopted in cases D and E?

G. Should restrictions as to character of stock and methods of manufacture be imposed at all? If so, to what extent?

H. What physical tests should be specified in cases D and E?

I. What chemical and physical requirements should be imposed in.

a. Steel castings?

b. Steel forgings, such as pins?

c. Rivet steel?

We would like your opinion on one other question, as it is one which naturally affects the cost of work, although not pertaining to steel making:

J. Do you consider the work performed by impact riveters in the field sufficiently good to warrant a reduction of the usual 25 per cent. added for field rivets? If so, how much should this reduction be?

The specifications which have been issued for the material for these new bridges over the East River at New York have led to a good deal of discussion in the steel trade. The requirement that acid open hearth steel made by the pig and ore process alone be allowed has caused much agitation. Naturally this feature was brought up by the experts present, Mr. Webster holding that reliable steel can be made by either the acid or the basic open hearth process, Mr. Stafford indorsing that view. H. H. Campbell of the Pennsylvania Steel Company, while not prepared to state the fact dogmatically, did hold to the view that acid open hearth steel is superior to the basic. Mr. Webster referred to the fact that brittleness in the material is due to two causes, either to segregation or to injudicious heat treatment. On some of the other points raised in Mr. Buck's letter Mr. Campbell dwelt on the fact that a given amount of carbon appears to have less effect on basic than it has on acid steel. The percentage of carbon must be higher in basic steel to produce the same physical tests. He held also that the carbon is not so uniformly distributed and that there is a greater tendency to heterogeneity in the case of basic steel. Mr. Stafford confirmed the statement that a slightly higher carbon content is necessary in basic steel to produce the same physical properties, amounting to 2 to 3 pounds in the case of steel testing at 60,000 pounds. Mr. McLeod of the Carnegie Steel Company placed himself on record as being willing to use either basic or acid steel without hesitation. Mr. Huston noted that in practice it is more feasible to make large marine plates of basic steel than it is to produce them from acid open hearth steel. He held that there is a less tendency to oxidation in the basic process, as proven by the fact that nearly double the quantity of ferromanganese must be used in the acid open hearth than is used in the basic, the quantities comparing as 450 to about 220 to 240 pounds. He made the point, too, that the so called "snakes" occur less rarely in plates rolled from basic steel than they do in plates made of acid metal.

Mr. Campbell expressed doubt as to whether the increased quantity of ferro necessary in the case of the acid steel is necessarily a proof of greater oxidation, Mr. Webster noting that the larger quantity depends upon the character of the stock used. Dr. Dudley raised the question whether it might not be wise to increase the carbon limit, arguing from the fact that in the case of axles recent practice has advanced the carbon specifications to 0.35 to 0.50, while 0.55 carbon steel is actually put into service. Generally speaking, high carbon does give better results, but as the carbon increases in quantity the steel must be watched more closely and the inspection be more rigid.

Mr. Buck raised the question whether it was fair to demand the same phosphorus in the case of acid and of basic steel, or whether more phosphorus ought to be allowed in acid steel. Mr. Huston reported that phosphorus above 0.04 was found to be injurious in basic boiler steel, and Mr. McLeod made the point that in the case of basic open hearth steel the presence of 0.07 to 0.08 of phosphorus was an indication that something had gone wrong with the heat. Mr. Campbell emphasized the fact that commercially 0.08 phosphorus in acid and 0.04 of phosphorus in basic open hearth steel are on the same ground.

The specification was now taken up paragraph by paragraph, Professor Merriman bringing up once more the point of the lack of system in the classification of the three different steels enumerated in paragraph 3.

Standard Specifications for Bridges and Ships.

PROCESS OF MANUFACTURE.

1. Steel shall be made by the open hearth process.

CHEMICAL PROPERTIES.

2. Each of the three classes of structural steel for bridges and ships shall conform to the following limits in chemical composition:

	Steel made by the acid process. Per cent.	Steel made by the basic process. Per cent.
Phosphorus shall not exceed.....	0.08	0.06
Sulphur shall not exceed.....	0.06	0.06

PHYSICAL PROPERTIES.

3. There shall be three classes of structural steel for bridges and ships, namely: Rivet steel, soft steel and medium steel, which shall conform to the following physical qualities:

	Rivet steel.	Soft steel.	Medium steel.
Tensile strength, pounds per square inch.....	50,000 to 60,000	52,000 to 62,000	60,000 to 70,000
Yield point, in pounds square inch, shall not be less than.....	30,000	32,000	35,000
Elongation, in per cent 8 inches, shall not be less than.....	26	25	22

5. For material less than 5-16 inch and more than $\frac{3}{4}$ inch in thickness the following modifications shall be made in the requirements for elongation:

a. For each increase of $\frac{1}{8}$ inch in thickness above $\frac{3}{4}$ inch a deduction of 1 per cent. shall be made from the specified elongation.

b. For each decrease of 1-16 inch in thickness below 5-16 inch a deduction of 2½ per cent. shall be made from the specified elongation.

c. For pins made from any of the three classes of steel the required elongation shall be 5 per cent. less than that specified in paragraph No. 4, as determined on a test specimen, the center of which shall be 1 inch from the surface.

6. Eye bars shall be of medium steel. Full sized tests shall show 12½ per cent. elongation in 15 feet of the body of the eye bar, and the tensile strength shall not be less than 55,000 pounds per square inch. Eye bars shall be required to break in the body, but should an eye bar break in the head and show 12½ per cent. elongation in 15 feet and the tensile strength specified, it shall not be cause for rejection, provided that not more than one-third of the total number of eye bars tested break in the head.

7. The three classes of structural steel for bridges and ships shall conform to the following bending tests; and for this purpose the test specimen shall be 1½ inches wide, if possible, and for all material $\frac{3}{4}$ inch or less in thickness the test specimen shall be of the same thickness as that of the finished material from which it is cut, but for material more than $\frac{3}{4}$ inch thick the bending test specimen may be ½ inch thick.

Rivet rounds shall be tested of full size as rolled.

d. Rivet steel shall bend cold 180 degrees flat on itself without fracture on the outside of the bent portion.

e. Soft steel shall bend cold 180 degrees flat on itself without fracture on the outside of the bent portion.

f. Medium steel shall bend cold 180 degrees around a diameter equal to the thickness of the specimen tested without fracture on the outside of the bent portion.

TEST PIECES AND METHODS OF TESTING.

8. The standard test specimen of 8 inches gauged length shall be used to determine the physical properties specified in paragraphs Nos. 4 and 5. The standard shape of the test specimen for sheared plates shall be as shown by the sketch accompanying the specification.

For other material the test specimen may be the same as for sheared plates, or it may be planed or turned parallel throughout its entire length, and in all cases where possible two opposite sides of the test specimens shall be the rolled surfaces. Rivet rounds and small rolled bars shall be tested of full size as rolled.

9. One tensile test specimen shall be taken from the finished material of each melt, but in case this develops flaws, or breaks outside of the middle third of its gauged length, it may be discarded and another test specimen submitted therefor.

10. One test specimen for bending shall be taken from the finished material of each melt as it comes from the rolls, and for material $\frac{3}{4}$ inch and less in thickness this specimen shall have the natural rolled surface on two opposite sides. The bending test specimen shall be 1½ inches wide, if possible, and for material more than $\frac{3}{4}$ inch thick the bending test specimen may be ½ inch thick.

g. The bending test may be made by pressure or by blows.

11. Material which is to be used without annealing or further treatment shall be tested for tensile strength in the condition in which it comes from the rolls. For material which is to be annealed or otherwise treated before use a full sized section of tensile test specimen length shall be similarly treated before cutting the tensile test specimen therefrom.

12. For the purpose of this specification, the yield point shall be determined by careful observation of the drop of the beam or halt in the gauge of the testing machine.

13. In order to determine if the material conforms to the chemical limitations prescribed in paragraph No. 2 herein, analysis shall be made of drillings taken from a small test ingot.

VARIATION IN WEIGHT.

14. The variation in cross section or weight of more than $2\frac{1}{2}$ per cent. from that specified will be sufficient cause for rejection, except in the case of sheared plates, which will be covered by the following permissible variations:

h. Plates $12\frac{1}{2}$ pounds per square foot or heavier, when ordered to weight, shall not average more than $2\frac{1}{2}$ per cent. variation above or $2\frac{1}{2}$ per cent. below the theoretical weight.

i. Plates under $12\frac{1}{2}$ pounds per square foot, when ordered to weight, shall not average a greater variation than the following:

Up to 75 inches wide, $2\frac{1}{2}$ per cent. above or $2\frac{1}{2}$ per cent. below the theoretical weight.

75 inches and over, 5 per cent. above or 5 per cent. below the theoretical weight.

j. For all plates ordered to gauge, there will be permitted an average excess of weight over that corresponding to the dimensions on the order equal in amount to that specified in the following table:

Table of Allowances for Overweight for Rectangular Plates when Ordered to Gauge.

The weight of 1 cubic inch of rolled steel is assumed to be 0.2833 pound.

Thickness of plate.—Inch.	Plates $\frac{1}{4}$ inch and over in thickness.		
	Width of plate.		
	Up to 75 inches.	75 to 100 inches.	Over 100 inches.
	Per cent.	Per cent.	Per cent.
$\frac{1}{4}$	10	14	18
$\frac{5}{16}$	8	12	16
$\frac{3}{8}$	7	10	13
$\frac{7}{16}$	6	8	10
$\frac{1}{2}$	5	7	9
$\frac{5}{8}$	$4\frac{1}{2}$	$6\frac{1}{2}$	$8\frac{1}{2}$
$\frac{3}{4}$	4	6	8
over $\frac{3}{4}$	$3\frac{1}{2}$	5	$6\frac{1}{2}$

Thickness of plate.—Inch.	Plates under $\frac{1}{4}$ inch in thickness.	
	Width of plate.	
	Up to 50 inches.	50 inches and above.
	Per cent.	Per cent.
$\frac{1}{8}$ up to $\frac{1}{16}$	10	15
$\frac{1}{16}$ up to $\frac{1}{32}$	$8\frac{1}{2}$	$12\frac{1}{2}$
$\frac{1}{32}$ up to $\frac{1}{64}$	7	10

FINISH.

15. Finished material must be free from injurious seams, flaws or cracks, and have a workmanlike finish.

BRANDING

16. Every finished piece of steel shall be stamped with the melt number, and steel for pins shall have the melt number stamped on the ends. Rivets and lacing steel, and small pieces for pin plates and stiffeners, may be shipped in bundles, securely wired together, with the melt number on a metal tag attached.

INSPECTION.

17. The inspector representing the purchaser shall have all reasonable facilities afforded to him by the manufacturer to satisfy him that the finished material is furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacture prior to shipment.

Under paragraph 4 there was some discussion as to the expediency of allowing the overlapping in the tensile strength requirements of the different steels. The point was made that manufacturers naturally tried for the intermediate point in the range so as to have a certain amount of leeway thereby.

On motion of Mr. Stafford the specification was again changed in this case so as to make the yield point admitted not less than one-half of the tensile strength.

As in the case of the specifications for structural steel for buildings, the specification for steel for bridges and ships was modified in paragraph 10 to read: "Sheared edges of bending test specimens may be milled or planed," and in paragraph 11 the addition of the following: "Where it is impracticable to secure test specimens after annealing." Similarly under variation of weight a provision was added that all plates 1-100 inch or less under ordered gauge shall be accepted as being to gauge.

Navy Yard Construction Plants.

Admiral Hichborn's Report.

WASHINGTON, D. C., October 30, 1900.—The annual report of Admiral Hichborn, Chief of the Bureau of Construction of the Navy Department, has been completed and is now in the hands of the Secretary of the Navy. It is unusually elaborate, owing to the fact that as Admiral Hichborn will be retired in the course of a few months, he has been at special pains not only to report fully upon the work of his Bureau, but to make important recommendations for the future of the naval service, based upon a practical experience extending over 45 years. An interesting feature of the report is a review combined with recommendations concerning recent improvements in navy yard construction plants. On this point the report says:

"At the navy yard, Portsmouth, N. H., facilities for the building and handling of boats have been considerably amplified, some special new machinery being installed for this work. A central power generating plant, associated with electric and compressed air transmission, has been put into operation. At the navy yard, Boston, the first work in connection with the installation of the central power plant with electric, pneumatic and hydraulic transmission has been undertaken, and it is hoped that within a comparatively short time this plant will be in complete working order. In connection with this steps have been taken looking to the substitution of electric motors for driving the heavy, separated tools or groups of smaller tools, and many of these are now so driven. Portable pneumatic tools for chipping, calking, riveting, &c., are also being introduced. At the navy yard, New York, very considerable improvements have been made in the foundry, increasing the capacity for rapid handling of both brass and iron castings. The installation of pneumatic piping, permitting the use of portable pneumatic tools, has been completed and is in operation, although compressors necessary to the full development of this system have not yet been installed. The central power, though incomplete, has been put into operation and awaits only certain changes affecting other departments at that yard to be completed. The introduction of a system of fuel oil firing for the bending furnaces and for crucibles, &c., in the foundry has proved an economical and valuable improvement. The growing need for metal substitutes for wood has made it necessary to provide many additional tools for sheet metal work, and these have been installed in the separate sheet metal working shop, capable of turning out all classes of sheet metal and wire work. The facilities for the prevention of and extinguishing of fire in the construction department have been very materially improved. At the navy yard, League Island, many necessary tools have been purchased, and in some cases it has been necessary to install them temporarily. The plant, with the improvements which have been made in the past two years, remains in a very incomplete state, which makes it desirable that it should be liberally dealt with in order to place it in a position to promptly and efficiently repair work. At the navy yard, Norfolk, the improvements have been in the direction of the purchasing and installation of modern labor saving machinery, with a view to making these improvements a part of a large scheme for general improvements in the plant. During the year there has been commenced a large general shipfitters' shop, advantageously situated with reference to the water front and the fitting out basin, and a combination shop between the timber dry dock and the new dry dock. Something has also been done in the way of introduction of electricity and compressed air as a means of transmission of power for the machine tools and for portable tools used on board ship. At the navy yard, Pensacola, preliminary work in connection with the installation of an efficient central power station has been done, and a limited amount of machine tools contracted for and other installation commenced. At the navy yard, Mare Island, work in connection with a central electrical station has been advanced to such an extent as to permit a portion to be in active operation. Considerable work has also been done in the way of providing machine and other tools for repair work at this yard, but the extensive changes in buildings, necessitated by the replacing of those destroyed by the earthquake, has made it necessary to install some of these tools temporarily in order to carry out current work. At the Puget Sound Naval Station, Bremerton, plate and angle furnaces have been constructed and a plant permitting the employment of pneumatic tools installed, as have also some motor driven wood working machinery, and some of the heavier shipbuilding tools, such as straightening rolls, punches, &c. Small improvements have also been made in the foundry, coppersmith shop and machine shop."

Admiral Hichborn calls attention to the necessity of establishing a naval station in the Philippines, at which

the larger vessels could dock and carry out minor repairs, and quotes from a special report to the Bureau concerning a desirable site at Subig Bay, which seems to be remarkably well fitted for the proposed purpose.

The Necessity of Additional Docking Facilities.

Attention is again called to the need of additional docking facilities for vessels of all classes. There are available at the present time on the east coast of the United States but nine Government dry docks of all sizes, distributed among seven ports, and of these but one is of sufficient size to take the battle ships. The docking facilities at present available are severely taxed under existing peace conditions, and it is said that the increase in facilities by completion of docks already under construction and appropriated for will scarcely keep pace with the growing need for such facilities in the increasing number of ships in service and in reserve.

"This disparity in docking facilities," continues Admiral Hichborn, "productive of much inconvenience and some loss in time of peace, would, in time of war, be an extremely serious matter, and might result in keeping a considerable portion of our naval strength ineffective at a critical time. It cannot be too strongly urged that the increase in docking and repair facilities in an adequate ratio to the increase in the fleet is a necessary element in naval development, and it should be especially emphasized that in this most important matter war requirements and not peace requirements must always be kept in view. Under the present policy only the increasing peace time requirements are being provided for. In this connection it is worthy of notice that Great Britain has, distributed in eight of her home ports alone, 52 Government docks and locks available for docking purposes, and that France, in five home ports, has 32 Government dry docks, and that in both countries there are numbers of private dry docks far in excess of those available in this country which could be employed by the Government in time of war. A policy of increase in docking facilities, based upon the war time requirement of our present and prospective naval strength, is urgently needed. The very considerable time which has been required for the preliminary steps and the execution of the work itself, in connection with dock construction in the past, makes it the more necessary that the matter should be taken in hand as early as practicable."

Building Vessels in Government Yards.

The report discusses in some detail the question of the building of war vessels in Government navy yards rather than by private enterprise. "Much has been said, both in favor of and against the building of vessels in the navy yards," says Admiral Hichborn. "The progress made in the improvement of yard plants and the ever increasing need for a permanent skilled force ready for and capable of at all times taking up repairs of any character which the growth in 'material' of the navy entails, makes it desirable that the question should be given careful consideration. There is at the present time, in view of the prosperous condition of the shipbuilding industry and the number of naval vessels building and appropriated for, sufficient work to permit the assignment of a portion of the building work to the Government yards without there being a question of the withdrawal or withholding of necessary support and assistance, through work given out, to a private industry, the maintenance of which in a high state of efficiency is unquestionably of national importance. These conditions make it possible to eliminate from the discussion any questions of policy except such as affect economy and efficiency. It has been the history of all the iron and steel navies in existence to-day that the building of the vessels was at first entirely confided to private industry, and that the existence of the nucleus of a steel fleet made it necessary that the Governments who were their owners should themselves provide for repairing these vessels; and that, having provided the necessary plant for this purpose, the provision for the maintenance of the equally necessary though vastly more difficult thing to attain—viz., efficient working organization and adequate efficient personnel, forced them to undertake in their navy yards a portion of the new building work. The extent to which this is being done by the principal naval powers will be noted from the fact that England is building 16 war ships in Government yards, France 17, Germany 8, Russia 6 and Italy 3.

"While, under existing conditions, in the case of the first vessels built in our navy yards it may be expected that the cost will not be greatly different from—may even be somewhat greater than for—the same work executed by contract in the private ship yards, the Bureau believes that such a course once entered upon would demonstrate its desirability and practicability in an increased efficiency and economy in naval administration, regarded as a whole, without interference with a judicious policy of such Government encouragement of the

shipbuilding industry as will keep the greatest number of establishments in a position to undertake and execute promptly any naval work which may be required."

Concerning the innovation of the superposed turrets of the new battle ships which have been the subject of so much discussion during the past year, Admiral Hichborn says:

"The decision finally came to in the arrangement of the batteries of the new battle ships was a compromise between opinions. The completion of the first battle ships to which the system has been applied, and the trials to which they have been subjected, have demonstrated only the mechanical practicability of the system of mounting. It has been recognized from the commencement of the discussion that there are such grave disadvantages in this system of mounting, as, impossibility of independent action of 8-inch guns in superposed turrets; great concentration of weight upon roller path and supports of such turrets; dependence of four important guns upon one controlling apparatus; disarrangement of training of three guns by firing of the fourth, and possibility of complete disablement of four important guns, or, say, 35 per cent. of the heavy battery, by mishap affecting the turret.

"The Bureau believes the arrangement of battery of vessels of war to be a matter of the very greatest importance. While seriously opposed to the system of superposed turrets on the grounds which it believes to be vital, it holds itself free from any prejudice which could not be removed by practical tests which the means now at hand make possible and which the importance of the matter makes imperative in order to limit a policy of compromise of opinions based upon theoretical rather than practical consideration."

Sheathing Hulls with Copper.

Admiral Hichborn is strongly in favor of sheathing with copper the hulls of all war vessels, and in the course of an exhaustive argument in favor of this practice, which he recommends for all vessels, he says:

"Although this matter has been the subject of considerable discussion during the last year, the Bureau deems it necessary that, in view of the great importance to the naval service of a thorough understanding of the question at issue, it should present a brief *résumé* of the points involved.

"Upon the surface of copper sheets when exposed to salt water there is formed, in addition to certain semi-soluble poisonous salts, an insoluble oxychloride of copper, which forms a thin film or scale upon the surface to which it is loosely attached. From time to time this thin film or scale, through its own weight or the weight of matter which has become attached to the surface, doubtless assisted in the case of sheets upon a vessel's bottom by the motion of the vessel through the water and among the waves, falls away, carrying with it all the matter which may have become attached to the surface and so exposing a fresh smooth surface of copper to be again similarly acted upon. This action is known as exfoliation, and it is the property of exfoliation by which the growths attaching themselves to the submerged surface of a copper bottom are from time to time deprived of their hold, that the antifouling properties of such a bottom are attributable. Innumerable antifouling paints have been proposed and put upon the market. All those attaining any degree of success by a wasting from the surface approximate to the exfoliating property of copper sheets depend for their success upon this wasting action. The speed of the vessel and the character and temperature of the waters in which she operates are the determining factors in the wasting action. A paint which is suitable for a vessel operating in tropical waters at a moderate speed is utterly unsuited for another vessel operating in the North Atlantic at the high speed of the fast liners. In the vessel of war, which is one day here and another day there, called upon in the course of a year's service to go into many waters and to operate at all speeds, with often considerable periods at anchor, it is a practical impossibility to prevent such fouling that in a short time after docking the speed is sensibly reduced, and after the lapse of a very few months her speed capabilities cut down 25 per cent. to nearly 50 per cent., except by providing her with a wood sheathed and coppered bottom. The process is an old one. Many of the arguments advanced against it are duplicates of those advanced years ago in England, the fallacy of which time and experience have demonstrated. It is hoped that a prejudice resting upon such foundation will not prevent a full understanding of the peculiar conditions which our very extended coast line and island possessions force upon us in time to have them properly met."

The Submarine Boat.

The very satisfactory work performed by the submarine boat "Holland" in a series of exhaustive tests

has convinced Admiral Highborn of the value of this peculiar type. In referring to it he says:

"The past year has brought to fruition the experimental work covering a considerable period and has demonstrated the practicability of the submarine boat. The vessel which the Department recently acquired has shown herself capable of such perfect control in the vertical plane that she may be kept within a few inches of any desired depth while moving or brought to the surface and taken under again in a very short time; her direction and control in the horizontal plane on the surface is effected with the same facility as any other craft, and submerged is limited only by the difficulties of vision; her crew are provided for on board with reasonable comfort and perfect safety for such periods as she may be in service, and working either upon the surface or submerged; and her armament, consisting entirely of torpedoes, gives her great offensive power. In spite of the unsuitableness of the forms of power generators at present available for a vessel running both on the surface and submerged, there is attained, under both conditions, a speed which, while not all that is desirable, will make the vessel capable of efficient service as an element for coast defense. Of the possibilities in the application of efficient submarine vessels to coast defense work it is not necessary to speak; nor is it necessary to do more than mention the economy of men and money in this form of defensive preparation and the moral effect upon an enemy which will come from a knowledge that we possess and are employing for coast and harbor defense vessels of so great possibilities. At least one European nation having a considerable coast line to defend has entered seriously upon the construction of submarine vessels, and has in hand, or projected, a considerable number of this class of vessel."

The report estimates that for the fiscal year ending June 30, 1902, the following appropriations will be required: For the preservation of and repairs to vessels of the navy, \$7,000,000; for repairs and improvements to navy yard plants, \$920,000; on account of hulls and outfits of vessels and steam machinery heretofore authorized, \$21,772,917. W. L. C.

Lake Iron Ore Matters.

DULUTH, MINN., October 27, 1900.—There have been spurts of heavy shipment from several districts during the past week, but as the month draws to a close it becomes more and more evident that business in November will be greatly restricted. There are no sales of ore from producers' hands, and shipments from most large mines have very closely approximated sales of the early season. Not much ore will be sent down in hopes of later sales. Rates are very low, wheat having dropped in the week to 1½ cents from Chicago, which is equal to about 60 cents on ore from the head of Lake Superior. Still a large proportion of the ships in the ore trade are getting \$1.25 a ton under contracts that expire Wednesday of the coming week. There is very little grain to move from the Northwest either this fall or the early part of 1901, and the shipments of package freight and lumber and coal will not make up for the deficiency. A little late coal may be brought up, and this will be at a rate high enough to make vesselmen a good extra profit in the fall business. Aside from this there is not much to be expected for the coming month.

It now appears that the mining companies of Michigan, that were so roughly handled by the State tax commission, will not have to go into the courts to secure a rebate of taxation. The law passed at the last session of the Michigan Assembly creating the tax commission and outlining its work did not repeal a prior law that decreed that taxes should be spread upon the books as equalized by the county boards. With this in force the counties are spreading the taxes as returned by the local boards and paying no attention to the tremendous raises made by the State commission. This makes a difference of about \$50,000,000 in the taxation of iron and copper mines in the upper peninsula of Michigan. It is not probable that a tax law such as that under which the commission worked can be passed at coming sessions of the State Legislature.

Menominee Range.

The De Soto Iron Company have commenced sinking one of the deepest shafts of the lake iron region at the Mansfield mine, Crystal Falls. It will be 6 x 16 feet and 1000 feet deep, and will be equipped for heavy and rapid work. The Mansfield, it will be remembered, is one of the few Bessemer mines of that district producing some ore of that grade, and is in the old bed of the Michigan River. A shaft was sunk upon this mine only about a year ago. The ore deposits are showing better with development, and the mine has an excellent future.

Corrigan, McKinney & Co.'s four mines at Crystal

Falls, the Crystal Falls, Great Western, Lincoln and Lamont, have been inspected the past week by Messrs. Hulst and Cole of the Oliver Iron Mining Company, the idea being for the Carnegies to buy the properties. Nothing definite is yet announced. The present owners secured the Crystal Falls in 1896 at a very small price, for it was little known, and was a non-Bessemer of supposedly small value. Since they have gradually taken over the remaining properties of the group at ridiculously low prices. At the close of 1898 they took the Great Western, and the Lincoln and Lamont later. All have been developed into extensive properties. The ore of the Crystal Falls is from 58 to 59 per cent. iron, and from 0.5 to 0.7 phosphorus, that of Great Western is about 60 per cent. iron and 0.5 phosphorus, and the others are much the same. The ore of these mines is particularly adapted for the basic process of steel making, and for that reason is supposed to be wanted by the Carnegies.

The Dunn mine, in the same district, that Corrigan, McKinney & Co. were preparing to reopen has been dropped for the present at least. The work of reopening this mine is a great undertaking, requiring a shaft 800 feet deep and new underground work altogether, and there was no certainty of any large ore body at the end. The shaft had progressed to a depth of 125 feet when orders came this week to stop.

The Aragon will extend two shafts to another level during the winter. Dober mine is preparing for an active winter. Mastodon ore body is said to have been struck on an adjoining property, which is to be explored at once. Work has been resumed at the Michigan, near Amasa, and much new machinery is being placed. It is an Oliver property.

Marquette Range.

The Imperial and Webster mines at Michigamme, closed by the Cleveland Cliffs Company, had been in operation 18 and 10 months, respectively. Both have been shipping all summer and have produced about 75,000 tons. They are to be kept dry and may reopen in a few months. They are limonite mines.

The Bristol Company's Beaufort mine, which was to close, will continue at work. Some recent discoveries in the lower drifts look very well and will be explored.

Work on the Marquette & Southeastern Railway, the old Munising Railway, now in the hands of the Cleveland Cliffs Iron Company, will be carried on the coming winter by extending the road and developing the country through which it will pass. It is proposed, it is stated, to reach Manistique, on the lake, which will make a road of far more than local importance. The road cuts one of the largest hard wood belts yet in Michigan, containing over 100,000 acres.

Further examination of the manganese mine at Copper Harbor increases its value, and the property will be a large producer another year, while some ore will be sent East this fall.

Mesaba Range.

Messrs. Gayley, Clemson, Hulst and Cole of the Oliver Iron Mining Company were on the Mesaba range Saturday of this week, where they went to investigate and probably to purchase two important explorations, those of O. D. Kinney and Wallace, Vivian, *et al.*, which had been under option for some months by the Minnesota Iron Company, but were abandoned by that company two weeks ago. The abandonment was the result of orders from New York, and did not indicate a lack of ore, though possibly there was not enough to warrant purchase on the basis hoped for by the venders. This announcement of investigation by the Carnegie interests will probably come as a surprise.

The Republic Iron & Steel Company have examined and may buy a property in 14, 58-19 that has been under exploration all summer, and may also take some adjoining tracts for exploration.

The Chisholm Iron Company have taken a lease on lands they have been exploring adjoining the Clark mine in 58-20, and will open a mine there at once.

Some new explorations are under way near the Biwabik mine, and others near the Fayal, with favorable results so far.

Up to the close of the week ore shipments from the line of the Duluth & Iron Range Road amounted to 3,600,000 tons, which is 400,000 tons less than its business all last year. It is not probable that the road will surpass the business of 1899. The Duluth, Missabe & Northern has reached almost 4,000,000 tons already. Its total last year was but 3,535,000 tons. D. E. W.

Among transfers of coal lands in Southern Pennsylvania recently made was that of a large tract in Indiana County to a Canadian company. It is said that a company will mine and ship coal to Hamilton, Canada, where it will be converted into coke in ovens that will save the by-products.

Canadian News.

New Ontario Exploration.

TORONTO, October 27, 1900.—In the last session of the Provincial Legislature a sum of money was voted for the purpose of defraying the expenses of an exploration of New Ontario that was ordered. Of the total 219,650 square miles of dry land in the province, the settled section is but a small part. Some knowledge we have of the great hinterland, but it is far from full. Though the region has been explored along several lines, the lines are too far apart for the knowledge thus acquired of the country to approach completeness. Not to speak of the topography of the country and of its resources, our knowledge of its physical geography is likely to be very greatly revised before it becomes nearly accurate. The object of the Provincial Government in asking the Legislature for authority and means to have certain tracts explored was economic. First, several companies had obtained charters for the building of railways into the north, and these companies sought Government aid. Other companies proposed to build other lines in the same general direction. To ascertain whether the country would be likely to afford traffic for such roads the Government thought it advisable to have a survey of the natural resources. Such a precaution was called for both in the interests of the public who would be taxed for the railway subsidies, and in the interest of British and Canadian capitalists who might think of investing in the bonds of the railway companies. Ontario's main railways run east and west, those running north and south going no farther up than to the uppermost of the lines running east and west. Consequently nearly all the new railway enterprises of the province look northward, most of them to a goal on Hudson's Bay. The exploration was also in pursuance of the Ontario Government's policy to spread population, in the belief that the more centers of population it formed the more would immigration, and consequently the production of wealth, tend to increase. A motive more immediately pressing than either of the above was the demand for mineral and timber lands in New Ontario. Most of the timber in the existing railway belt had disappeared, and syndicates were organizing to secure grants of great extent near and beyond the light of land. These syndicates were made up of men who had had explored for them the particular river valley they desired. They knew how much and what kinds of timber the region yielded, but the Government did not know. Several concessions were thus blindly made to pulp companies. Similarly, grants of mineral land had been made before the Government had the information it should have in order to be assured that it was doing no injustice to the country. Such concessions as these bred sharp criticism, and the exploration was determined on.

The work was divided among ten parties, and the region covered lay between the west side of Lake Nepigon and the eastern boundary of Northern Ontario. To each party was allotted a tract more or less exactly defined. The parties left Toronto last May, and are now returning. Three of them have arrived and made a preliminary report to the Commissioner of Crown Lands. Speaking in a general way in press interviews the heads of the expeditions that have got back describe the country as exceedingly rich in minerals, timber, farm land and water power.

A body of iron ore that is reported to be very large has been discovered near to Lake Temagami, about 50 miles above North Bay and west of Tonneseau district. In the same vicinity nickel veins were found last season. The discovery was made by a Sudbury prospector.

Dr. Ludwig Mond Here.

Dr. Ludwig Mond of London, England, accompanied by his son, Robert, and by D. B. Mohr, an English mining expert, arrived in Toronto last week. Some time ago Dr. Mond purchased or secured options upon extensive nickel properties near Whitefish, in the Sudbury district, and the present trip is for the purpose of seeing these properties. For the past year gangs of men have been at work with diamond drills, and the time has arrived when the construction of a smelter is to be considered. Dr. Mond appears to be well satisfied with the account that has been given of the claims by the diamond drill tests. He was at the Parliament buildings in this city conferring with Premier Ross. It is presumed that his interview with the Minister related to the law passed last session subjecting ore or matte to a special tax when exported. That law has been kept suspended from the time of its enactment, but effect may be given to it at any moment the Government chooses to proclaim it. Protests were made against it when it was under debate in the House, and in these protests persons joined whose opinions on other points of the nickel question are the most dissimilar. The representatives of Ludwig Mond were among the protesters. It is not believed that the law will ever be

put in operation, and it is supposed that Dr. Mond's interview with the Premier was for the purpose of getting assurances on that point before making purchases of lands he holds options on, before building a smelter and thus preparing to export matte to his works in England.

Nova Scotia Steel Company.

A special general meeting of the Nova Scotia Steel Company was called on the 20th inst. to pass certain by-laws and resolutions. The first of these was as follows:

"That the directors be and they are hereby authorized to sell, transfer and convey the whole of the property, business, franchises, undertakings, rights, powers, privileges and assets of the company for such price as they may deem advisable, provided that the said price shall be sufficient to pay off the present bond issue, pay the preferred and ordinary shareholders par in cash for their shares, or to give them preferred and ordinary shares respectively in a new company to be organized of not less than an equivalent par value to their present holdings in this company.

The above by-law is in pursuance of powers conferred on the company by an act passed at the last session of the Dominion Parliament.

Another item of business was the ratification of a by-law passed at a special general meeting of the company last June. That by-law was as follows:

"That the directors may and they are hereby authorized and empowered to borrow upon the credit of the company such sum or sums of money as they may in their discretion consider necessary for the purpose of the company, not exceeding in the whole the sum of \$1,500,000, and to issue bonds, debentures or other securities for any sum or sums so borrowed, at such price or prices as they may deem necessary or expedient, but no such debenture or debentures shall be for a less sum than \$100.

"And the directors may and they are also hereby authorized and empowered to hypothecate or pledge all or any of the real and personal property of the company to secure any sum or sums so borrowed."

Also resolutions passed at the June meeting referred to had to be approved and confirmed at this meeting, as well as all the acts and proceedings of the directors relating to the issue of bonds provided for in the above quoted by-law. The meeting was thus to prepare for the evolution of the company into the greater concern who are to have iron and steel works at North Sydney in connection with the coal mines acquired from the General Mining Association.

It is announced that the Nova Scotia Steel Company, like the Dominion Iron & Steel Company, have made a purchase of manganese deposits. Areas of manganese in the Magdalen Islands have been sold to the former company by W. G. Tait of Pictou, and the amount mentioned as the price for them is \$300,000.

Steel and Iron Works for Welland.

The project for establishing iron and steel works at Welland makes slow progress toward realization. From time to time statements are given out which bear the construction that progress is being made, and that substantial interests are being enlisted. Several months ago it was said that one group of American capitalists had taken the idea up, and were prepared to launch into constructive operations as soon as the act of incorporation was passed and arrangements were made with the municipality of Welland. These particular capitalists do not appear to have been forthcoming with their cash, and now another group is said to have been formed to take hold of the enterprise. An iron and steel industry on the Welland Canal of dimensions scarcely, if any, inferior to that of the works going up at Sydney, Cape Breton, would be a welcome acquisition. A condition which cannot fail to be of prime importance in the minds of investors who have the scheme under consideration is the bounty on iron and steel. After April, 1901, that bounty begins to decline at an annual rate of 20 per cent., so that by April, 1906, the bounty will be wiped out. That is, unless there is a change of Government. If the Conservatives should win in the general elections on November 7 the law sending off the bounty in this way might be repealed. Possibly the Conservatives would attain their protective ends, however, by not interfering to save the bounty and by increasing the duties on pig iron, steel and all forms of their products to or beyond the old protective rate. In that case, there would doubtless be more prospecting with the schemes now before the public for the floating of iron and steel companies.

Minor Notes.

Thirty employees of the foundry department of the Laurie Engine Company's Works, Montreal, struck some mornings ago. Their action was caused by the dismissal of two men for incompetency.

To the Paris exhibit of mineral ore made by the Ontario Bureau of Mines the grand prize has been awarded.

An Ottawa deputation waited on the Ontario Government here a few days ago to obtain the privilege of developing power on the Ottawa River at Britannia, a few miles above the capital.

The Electric Construction Company of London, Ont., are asking tenders for the erection of a new factory.

A British firm manufacturing aluminum vessels, hollow ware, &c., are establishing an agency in Canada.

C. A. C. J.

The Allis-Andrew Sheet Rolling Process.

On Saturday, the 27th ult., an exhibition of the Allis-Andrew process for rolling black plates from which tin plates are made was given at Bridgeport, Conn., to a party of some 25 prominent iron, steel and metal men by Thomas V. Allis, the resident partner and engineer. There were present John Fritz of Bethlehem, Pa.; Col. N. H. Heft, C. E. Department N. Y., N. H. & H. R. R. Company, who has recently been complimented by the American Street Railway Association, who elected him to their second vice-presidency; Senator P. H. Skidmore of Connecticut; Charles Kirchhoff, editor of *The Iron Age*; Willis F. Hobbs, one of the originators of the Wilmot & Hobbs Mfg. Company; James B. Pratt of John S. Leng's Sons & Co., importers, of New York, and James L. Macgovern, journalist. The Carnegie Steel Company were represented by John M. McLeod, assistant to the president, and Lewis T. Brown, general superintendent of the Union Mills; the American Sheet Steel Company by their president, George G. McMurtry; the National Steel Company by their treasurer, F. S. Wheeler; the American Tin Plate Company by W. T. Graham, first vice-president; Warner Arms, second vice-president, and C. W. Bray, chief engineer, and the Bridgeport Brass Company by George E. Somers, president, and N. M. Beach, treasurer and general manager.

The process these gentlemen inspected is a new method of hot rolling metals of different kinds down to very thin sheets, not thicker than paper if required. It is claimed its advantages are economy of production and the ability to roll much greater lengths than heretofore produced. The original idea was conceived and patented several years ago by Henry Herbert Andrew of Sheffield, England, head of the old established firm of John Henry Andrew & Co., of which Lord Charles Beresford is chairman. Nearly all of the tram road cables used in this country are made from their steel, as well as thousands of miles of wire rope. While in the United States some two years ago Lord Charles Beresford, Mr. Andrew and others were the guests of Mr. Allis in Bridgeport on a tour of inspection of the then partly developed system which Mr. Allis has since developed further.

The experiments have been conducted at the plant of the Aluminum Brass & Bronze Company, now owned by the Bridgeport Brass Company, an 18-inch two-high mill, with 18-inch face, having been used in the work. Mr. Allis aims at rolling sheets in long strips from packs, his first step being to coat the strips with a composition which prevents the sticking of the sheets during rolling. The pack of strips is riveted together at one end, the initial thickness of the strips being 1-16 inch. The pack, consisting of eight strips, is heated in a gas furnace mounted on wheels in such a manner that it can be moved laterally and to and from the mill, the usual position being immediately in front of the latter. The furnace consists of a channel of the width of the pack, supported on stools, which thus forms a combustion chamber under the channel. Into this chamber the illuminating gas and air are conducted, so that the pack is heated by radiation in a very uniform degree. The pack, properly heated, is introduced between the rolls, with the riveted end in advance. Mr. Allis has, after a series of experiments, adopted a device consisting of claws which prevents the pack from spreading when it passes through the rolls, and thus give rise to cracked edges.

With the apparatus available Mr. Allis has rolled packs as long as 26 feet from $\frac{1}{4}$ -inch skelp 10 inches wide. The majority of his experiments have been made with 4-foot strips 1-16 inch thick and 10 inches wide. After the first pass the steel has been reduced to an average $\frac{7}{1000}$ inch thick, the elongation being from 4 feet to 7.95 feet. The second pass has carried the thickness down to an average of $\frac{19}{1000}$ inch, the elongation being to 13.80 feet, while the stock after the third pass had been reduced to an average of $\frac{11}{1000}$ inch, and the elongation brought to 18.76 feet, the spread from first to last being $\frac{3}{4}$ inch, so that the stock would trim close to the original 10-inch width.

The furnace and mill exhibited to the assembled experts at Bridgeport last week are experiments only, the object being to demonstrate the success of the underlying principles involved. Mr. Allis has developed elab-

orate and comprehensive plans for carrying out his ideas on a commercial scale.

PERSONAL.

Michitaro Oshima of Tokio, Japan, director of the new Imperial Steel Works now under construction by the Japanese Government, was in Pittsburgh last week for several days. During his visit in Pittsburgh he placed several large contracts for coal mining machinery.

James T. Goodwin has resigned his position as foreman boiler maker of the Rogers Locomotive Works to take charge of the new boiler shop of the Richmond Locomotive & Machine Works, Richmond, Va., now nearing completion.

John A. Walker, vice-president and general manager of the Joseph Dixon Crucible Company, Jersey City, N. J., sailed for Europe on Tuesday, October 30, by the "Kaiser Wilhelm der Grosse."

F. B. McKune has resigned his position as superintendent of the open hearth plant of the Republic Iron & Steel Company, at Minneapolis, Minn., and has accepted a position with Hamilton Steel & Iron Company, Hamilton, Ontario, Canada, as superintendent of their open hearth and blooming mill.

Wm. L. Simonton has been appointed district manager of the mills of the Republic Iron & Steel Company, at Youngstown, Ohio, Sharon and New Castle, Pa., succeeding James A. Campbell, resigned.

Beauveau Borie has been elected president of the Philadelphia Stock Exchange.

P. A. B. Widener of Philadelphia has been elected a director of the American Steel & Wire Company.

Lee H. Bowman, of the armor plate department of the Homestead Steel Works of the Carnegie Steel Company, has returned from Russia, where he has been superintending the placing of some armor plate on Russian vessels. Mr. Bowman expects to return to Russia next spring.

Clement M. Biddle, Jr., formerly in charge of the Pittsburgh office of the Biddle Purchasing Company, has resigned his position with that concern and has been appointed assistant district sales agent of the American Steel Hoop Company, located in the Empire Building, Pittsburgh.

Andrew Carnegie has sailed for this country and is expected to arrive about November 2. Mr. Carnegie will likely spend a week or two in Pittsburgh, and Room 327 in the Carnegie Building, in that city, is being fitted up for his use.

A. F. Yarrow, the famous English shipbuilder, has returned home after a very brief stay in this country. He was entertained at the Engineers' Club in New York on Tuesday.

Judge E. H. Gary, president of the Federal Steel Company, has arranged for the erection of a Methodist Episcopal Church to take the place of an old one at Wheaton, Ill., to cost \$60,000, as a memorial to his parents, who were members of the congregation for which this building is intended from the organization of the society. Mr. Gary spent his boyhood and much of his adult life in Wheaton.

John Stambaugh, Jr., has retired from the position of general manager of William Tod & Co., engine builders, at Youngstown, Ohio, to assume the management of the Youngstown Steel Company, operating a blast furnace at Youngstown and making washed metal. Mr. Stambaugh is secretary and treasurer of this concern. Mr. Stambaugh does not succeed Tod Ford as president of the Youngstown Steel Company, as stated. Mr. Ford continues to hold that office, but ill health compels him to relinquish active management. Mr. Stambaugh will be succeeded as general manager of William Tod & Co. by M. A. Neeland, formerly chief engineer of the National Steel Company, at Youngstown. Mr. Neeland will assume the active management of William Tod & Co. as soon as his duties with the National Steel Company will permit, which will probably be about January 1, 1900. The report that William Tod & Co. would sell out their business to a combination is untrue.

George B. Hayes, formerly of Buffalo, has been elected a vice-president of the United States Cast Iron Pipe & Foundry Company, A. H. McNeal having resigned. E. C. Fuller, formerly of Columbus, Ohio, is now attached to the headquarters at New York, with extensive powers.

Archer Brown of New York has contributed to the November *Forum* a thoughtful and interesting article entitled "The Revival and Reaction in Iron."

J. Langeloth, president of the American Metal Company of New York, has returned from Europe.

The Iron Age

New York, Thursday, November 1, 1900.

DAVID WILLIAMS COMPANY,	-	-	-	-	-	PUBLISHERS.
CHARLES KIRCHHOFF,	-	-	-	-	-	EDITOR.
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RICHARD R. WILLIAMS,	-	-	-	-	-	HARDWARE EDITOR.
JOHN S. KING,	-	-	-	-	-	BUSINESS MANAGER.

Standard Specifications.

An enormous amount of earnest and exceedingly valuable work has been done in a very quiet way by the men who gathered at a meeting in this city last week. So far as we can learn the American Section of the International Association for Testing Materials is leading in the undertaking, whose ultimate end is to be a set of international standard specifications for iron and steel. Although possibly the representatives of the manufacturers may have dominated in its councils through their keen and intelligent interest in the work it is quite clear to the outside observer that the independent testing engineers and the experts of large consuming interests have wielded a very powerful influence. In fact, at the first blush the impression might be created that the representatives of the steel works deferred rather unduly to the desires of the consumer. As drafted by the committee a number of the specifications were brought to the attention of foreign makers during the past summer and met with the universal objection that they were too severe. We believe, however, that those who framed the proposed standard specifications erred—if that criticism be just—on the right side, since it will be a powerful incentive to a general adoption of the specifications if they escape the suspicion that the maker rather than the consumer was favored in framing them.

As a matter of fact, great as has been the labor and skill in drawing up the proposed standard specifications, the more vital undertaking calling for persistence and tact is that now before those who initiated the movement, and that is to secure their general adoption. They are now before the engineering community at large for further discussion, and it is not yet quite clear in what manner that may best be brought about.

In this country the representatives of the great consuming interests realize fully that it pays them and their principals to do all in their power to forward uniformity in requirements and brush aside cranky demands. American railroad and civil engineers understand that it is not necessary for them to earn their incomes by making a show of harring manufacturers. We feel sure that they will discuss any reasonable proposals on their merits without any mental reservations as to imaginary effects upon their personal or professional interests. They do not feel that their record must be dotted with at least occasional rejections much like a policeman who feels bound to keep up to a given average number of arrests. In this country the relations between inspecting engineers and manufacturers have long ceased, generally speaking, to be characterized by mutual distrust and dislike. The more frequently a common ground is sought and found the better for all concerned. What has been done thus far by the International Association for Testing Materials has aided much in this direction. What may still be accomplished along the same lines is hardly realized by the trade. But even as it is the workers in this field deserve and should receive continued encouragement and hearty support by all.

Pure Physics and Applied Science.

At the recent meeting of the British Association Professor Arnold of Sheffield presented a paper on the "Architecture of Steel," in which we find a curious and somewhat surprising indictment of the physicists of the Royal Society. Coming from one who may be supposed to occupy a position in the *Zona Libra* between abstract and applied science, which is the academic viewpoint, what Professor Arnold has to say is likely to attract attention. After explaining that in the study of iron and steel the results of chemical analyses and physical tests are to a great extent abstractions until made intelligible by microscopy he concluded his paper by deploring the manner in which physicists ignore the work of the metallurgists. The result was that what might be very valuable researches could not be accepted as trustworthy by metallurgists, because they knew that, although the researches had been conducted with much skill, nevertheless at the outset the physicist almost invariably neglected the most elementary metallurgical precautions, simply because, as a doctor of science had remarked to him, "physicists cannot find time to read the technical papers." To this might be replied that physicists could find time to make elaborate researches under conditions which rendered even approximate accuracy impossible. He would put the indictment into concrete form and take a series of steel bars upon which determinations of permeability and permanent magnetism were about to be made for correlation with carbon percentages. Many such determinations had been made, but the results were of more than dubious accuracy. Analyses were given, but it was seldom ascertainable whether the drillings were taken from the bar or the ingot. The previous thermal history of the steel was never stated, and, indeed, was generally unknown, yet it was of the greatest importance that such data should be given. Again, no micro-sections of bars or rings ever seemed to be made, though this was a question of vital importance. How to remedy such a deplorable state of affairs was not clear. Pure scientists would not read the work of the applied scientists because it was published in the technical papers. Purely scientific societies would not recognize applied work, nor would they allow papers on such subjects to be published in their proceedings. The net result was that the pure physicist and the applied physicist, instead of working together, the one supplementing the work of the other, were at cross purposes. From the discussion which followed it appears that, while no great difficulty is experienced in securing the acceptance of papers on applied science by the Royal Society, they are taken only for filing and are invariably excluded from the published transactions, by reason of which exclusion they fail to reach the original investigators in the field of pure science, who would find them useful but who will not read the technical papers.

If the facts are as stated by Professor Arnold, and we have no doubt they are, they are not at all surprising, and give no better basis for complaint than that nature did not endow the average man with the capacity to combine enthusiasm for abstract science with a keen and businesslike perception of the value of practical applications. From the beginning of civilization to the present time those devoted to abstract science have devoted the greater part of their lives to "finding out things that are not so," and incidentally discovering basic truths of inestimable value which have repaid their effort. Men of this class are not, and never can be, made practical in the modern utilitarian sense. To hedge them round with limitations and insist that their work shall conform to the conditions insuring accuracy

would be to destroy what usefulness they now possess. Their processes are inductive rather than deductive. As the rule they do their best work along lines apparently leading away from rather than toward practical results; but in the mass of facts and assumptions they accumulate the experimenter for results finds value which abundantly repays careful sifting. In the search for the impossible and nonexistent which the mediaeval alchemist followed so assiduously was laid the foundations of modern chemistry; and the modern astronomer-mathematician owes much to the astrologers whose search of the heavens had no more practical purpose than to read the future.

The progress of the arts and sciences owes most to the class of men occupying a middle ground between the abstruse physicist and the practical manufacturers having only profit in view. These men are not great original investigators, but they recognize the practical side of every proposition and know how to turn all useful knowledge to account. They are the inventors and adapters, with a talent for "convenient means." For these the physicists are constantly breaking paths, and behind them follow the men of affairs who utilize for profit.

It is natural for men of Professor Arnold's stamp to be impatient of the infatuation with which the shining lights of the Royal Society pursue abstractions and forget the safeguards which would give the results more practical value, but it is useless to scold them for not doing what experimenters with a keener instinct for the practical world find more immediately useful. They are utilizing their talents to the best possible advantage as it is, and are as indifferent, temperamentally, to what the blacksmith would find useful at his forge as the blacksmith is to whether tests of the permanent magnetism of steel are properly safeguarded against misleading conclusions. Men like Rumford are not born with every generation, and if they were the progress of knowledge would force them to specialize sharply. In rejecting everything which savors of "crude experience" a body like the Royal Society is, we think, perfectly right. It is a mistake, however, to assume, as Professor Arnold does, that because the "pure physicist and the applied physicist" do not work together they are working at cross purposes. Each follows his bent and does that which seems to him most useful. The student of applied physics can make whatever use he pleases of what he finds ready to his hand, but should he try to make the original investigator practical he would, at best, destroy his usefulness.

A regrettable incident recently occurred in one of our large steel works. A visitor from abroad was courteously granted permission to inspect the plant and observe the methods in use. In passing through some of the departments he was so eager to take advantage of the opportunity thus given him to see ingenious labor saving devices that he made sketches of them in the presence of his guide. The action of the visitor was reported to the officials of the company, who are so incensed at this breach of courtesy that future applications for permission to visit their works are likely to meet with refusal. Thus the offense of one man will have a serious effect on probably a large number of men who would otherwise have been freely accorded the same privileges that were given him. Our manufacturers, with but few exceptions, have been extremely liberal in permitting both domestic and foreign competitors to visit their works, but they expect such visitors to make use of their eyes and ears only while passing through. If they can remember enough of what they have seen to be able to

make sketches when they get outside, they are of course at liberty to do so. But what has thus been carried away has not been deemed of sufficient consequence to bar the admission of other visitors.

Last week a Chicago court decided that the owners of a building having a smoky chimney are liable for damages to persons whose property is injured by the smoke and soot. The award for damages was \$1500. The suit was brought by occupants of an office in an adjoining building, who presented conclusive evidence to sustain it. The amount awarded is so large that the case will doubtless be appealed, as other suits would follow from numerous sufferers. The defendants are owners of a large office building, who have less excuse for maintaining a "smoke nuisance" than if they were manufacturers. The case is attracting widespread interest, as it has an important bearing on the hastening of the day when smoke preventing or smoke consuming devices will be in general use wherever bituminous coal is burned.

Trials of H. M. S. "Viper."

The following communication of Charles A. Parsons, inventor of the Parsons steam turbine, to the *London Times* will be read with interest in these days of high speed torpedo boats:

The recent trials of H. M. S. "Viper," which is the first torpedo boat destroyer to be fitted with steam turbine propelling machinery, have attracted much attention, and as the results, which have been published from time to time in your columns, have proved entirely successful, the specified speed being greatly exceeded and all previous records (including those of the "Turbinia") having been broken, perhaps I may be allowed to discuss certain points in connection with the figures attained which are of considerable interest and importance. We had not ourselves thought of making a strict comparison between the coal consumption of the "Viper" at any particular speed with that of other vessels of similar tonnage, as she differs in essential particulars from all other vessels, and such a comparison would be entirely misleading unless accompanied by a full statement of the principal features of the vessels to be compared, with their necessary bearing upon the results. But, as other persons have thought well to make an unqualified comparison, I now propose to briefly place the case on a sound footing, and I may add that the comparison is interesting and instructive, especially to those whose business it is to design or to use fast vessels.

The trials of the "Viper" have been somewhat more elaborate than usual for torpedo boat destroyers, though they do not by any means as yet cover the whole of the ground. They have included a coal consumption trial of the contract speed of 31 knots, the mean speed during the three hours being 31.118 knots, and the coal consumption, as determined from the usual hull resistance experiments, 2.38 pounds per indicated horse-power per hour, the contract being not to exceed 2.5 pounds per indicated horse-power. The power required for this speed is about two-thirds of the maximum for which the engines and boilers were designed, the maximum being upward of 12,300 indicated horse-power, which power has been realized on preliminary, but official, full power contractors' trials, the maximum mean speed then reached being 36.858 knots.

The second official trial was a three hours' coal consumption trial, with the air pressure limited to 3½ inches, and carrying the full weights as determined by the previous trial under the usual Admiralty conditions.

A mean speed of 33.838 knots was maintained with about four-fifths of the maximum power, the coal consumption being at the rate of 2.49 pounds per indicated horse-power per hour.

The third official trial was the usual 12 hours' coal consumption trial at cruising speed.

In recent years the stipulated speed on this trial has been increased from 13 knots to 15 knots (this I mention as the coal consumption of the "Viper" at 13 knots is only about two-thirds of that at 15 knots). The ascertained coal consumption of the "Viper" on this trial was at the mean rate of 27 cwt. per hour. It should be mentioned, however, that H. M. S. "Cobra," the second fastest ship afloat, with the same sized turbine engines and similar in every respect to the "Viper," but loaded to service conditions and having a displacement of 442 tons, or about 60 tons greater than the "Viper," consumed on her official 15 knot trial 24.58 cwt. per hour. In her case the port engines only were used, the star-

board engines being dragged round by the propellers, and it is probable that the "Viper" with her less displacement would, when using one set of engines only, burn less coal than the "Cobra." As, however, it would be instructive to ascertain this result definitely, it is probable that this test will be made at an early date.

Now to the case in point.

A comparison has been made of the coal consumption of the "Viper" and the "Albatross" at a speed of about 31 knots.

It so happens that the two vessels have the same displacement, and it is tacitly assumed in the accounts that the horse-power necessary to drive the two vessels is the same, which is by no means the case, for the following reasons: In the case of the "Viper" all the underwater fittings, such as rudder, the shafts and brackets for carrying the propeller shafts, the propeller blades and bosses, &c., have all been designed to stand the highest speed of over 36 knots, and are of considerably larger and heavier scantlings than usual, and in consequence offer increased resistance to their passage through the water. So much for the shipbuilders' point of view.

Now for the engineer's side of the question. To give to the "Viper" her five extra knots, and to absorb usefully the relatively enormous horse-power developed by her engines, her propellers have extra width of blade and a much greater total blade area than that of the "Albatross," whose maximum horse-power is only about two-thirds of the "Viper's." This greater blade area is not only useless at lower speeds, but involves a positive waste of power at such speeds, owing to the increased skin friction. If, on the other hand, the "Viper's" propellers had been designed for a maximum speed of only 32 knots (the contract speed of the "Albatross"), they would undoubtedly have given superior results of about 31 knots.

Then as regards the turbine engines themselves. At the speed of 31 knots the "Viper's" engines are working at only two-thirds full power, and are necessarily less economical than if they had been smaller and designed for the power required for 32 knots.

Then there are the boilers to compare—a very important item in the case.

The "Viper" has the well-known Yarrow boilers, of simple construction and of great durability and power, but is without any refinements external to the boiler for attaining the highest possible economy of coal—refinements, be it said, of somewhat doubtful advantage in ordinary service. The "Albatross," on the other hand, has the well-known Thornycroft boiler; she has also feed water heaters to increase the efficiency, and also compressed air jets for promoting more complete combustion of the furnace gases before coming in contact with the tubes.

These are now the factors of chief importance bearing upon the question of the relative coal consumptions of the turbine engines and reciprocating engines in the respective vessels.

On the one hand we have the larger engines, greater propeller blade area, heavier underwater fittings, greater hull resistance, powerful, durable boilers of simple construction without external adjuncts for attaining the highest economy on trial, the vessel being capable of a speed of five knots in excess of any vessel propelled by reciprocating engines.

On the other hand we have a vessel whose engines and propellers are capable of developing only about two-thirds of the horse-power of the other, designed for a much lower speed—in fact, about that at which the comparison is taken—and having boilers of noted efficiency in coal, assisted by somewhat complex additions for further increasing the economy.

That the reduction in the coal consumption attributable to the aggregate of these important differences greatly exceeds the difference between the coal consumption of the "Viper" and the "Albatross" at about 31 knots speed there can be no question whatever, and there cannot be the slightest doubt that in every class of vessel (excepting only very small or slow vessels) it will be found that the turbine system of propulsion will give superior results over the reciprocating engine as regards coal consumption.

In the "Viper," in spite of these losses of power at lower speeds which we have described, and incurred in order to reach the record speeds attained (speeds only attainable by turbine machinery), without any special effort to attain economy, even so, her coal consumption per horse-power realized is very little in excess of the best, and less than that of many of the 30-knot destroyers.

In the specifications of most Admiralties for torpedo boats and destroyers the question of speed is placed in the forefront and enforced under heavy penalties, culminating with the option of complete rejection of the vessel should the deficit reach more than two to three knots below that contracted for. The coal consumption is relatively placed in the background.

This being so, the designers of the "Viper" may be pardoned if they have made every effort to attain the highest possible speed and have not given sufficient consideration to the question of obtaining the utmost economy of fuel of which turbines are capable; but in this their first destroyer they can at least claim to have beaten all records of speed by a long interval, and in their future ships they will be able to show by how much they can beat all records as to economy in coal.

Pacific Coast News.

SAN FRANCISCO, CAL., October 22, 1900.—One of our leading foundries is to have a big shipyard and dry dock with it. This is all the legitimate result of an active business year and a necessity for increased accommodation. So that hereafter the shipbuilders of the United States will have a new competitor for the building of the vessels of our navy and in iron and steel shipbuilding generally. This gives San Francisco at present three completely equipped shipyards to build anything the world may want, from a steam launch or a ferry boat to the mightiest ship of war that floats. The new establishment, or rather the old one rejuvenated, will be located at the Potrero, which will then have two establishments of this kind, employing about 5000 men and boys. This is sufficient to support a good sized city of itself. In referring to shipyards, I wish to say that the "Wisconsin," on her trial trip in the Santa Barbara channel, beat all records as to speed in battle ships, making 17½ knots an hour. Every vessel built here has beaten the record of her predecessor, and as regards shipbuilding on the Pacific Coast the outside world will have to look to its laurels. With the growing demand for architectural iron work and the activity in iron and steel shipbuilding that is promised it seems to me that we should not be far from the time when a steel plant should be put up in San Francisco. There is abundance of good iron ore in the State or near its borders, and with cheap fuel, in the shape of oil, the problem, although presenting grave difficulties, should not be impossible of solution. Such an establishment would not be dependent on San Francisco for a market but would have all the countries on the Pacific open to its products and the trade would be increasingly important from year to year. The matter has been under serious consideration by those representing vast interests on this coast for the past couple of years. Meanwhile we continue to draw heavily on the South and East for steel, iron, hardware and numerous other articles represented in the long category of these industries.

Nothing more has been heard of the strike that I wrote to you about in my last letter, and in fact the several strikes talked about of late have either died a natural death or are in process of doing so. As a rule, labor is better paid in California and more particularly in San Francisco than in any other part of the United States, and it does seem suicidal for men who average \$3 a day to be trying to reduce the hours of labor, while our Eastern manufacturing competitors generally pay less wages, and where there is a difference their men work longer hours. This, with our restricted market, places us at a great disadvantage, and in some cases if the employer was forced to accede he would soon be obliged to close his doors. But all this seems lost on the leaders in the strikes for shorter hours. The only protection that our manufacturers have against the fierce competition of the East is the freight tariff, and every day this is becoming more and more inadequate to help out against other disadvantages. In fact, existing conditions will have to be equalized very much indeed ere strikes in San Francisco for higher wages or shorter hours will be anything more than a desperate albeit unconscious effort on the part of the strikers to transfer all that business further East.

And while I write this it has become known to me that the time is fast approaching when freights from the East to this city will be reduced to their lowest terms. The new steamship line that I referred to in these columns on more than one occasion has one steamship now up for this city in Eastern ports. That is the "Hyades," while the "American," the "Hawaiian" and the "Oregonian" are being got ready in Eastern shipyards. These, like the "California," taken by the Government for a transport, are to be each of 8500 tons burden, while the "Alaskan" and the "Arizonian," for which the contract has been given and which are to be built in this city, will be each of 12,000 tons. These powerful steamers will make round trips between Eastern ports, San Francisco and Honolulu. They will come into direct competition with the railroads and the Pacific Mail Company, and freights will then be reduced to their lowest terms. One thing they will do, and that is they will enable the hardware, iron and steel trade of this city to ship their goods further into the interior than ever before. Of course

the railroad will make on the haul from the port to the place of destination. The mere statement of the case, however, suggests more or less complications, and the advent of these steamships will give rise to an entirely new situation in the matter of Pacific Coast freights.

We continue to have generally fine weather and a fairly good business in all lines, the hardware, iron and steel business included. We had some heavy rains last week which have improved the farming outlook materially. There was some damage to unharvested beans and ungarnered grapes, but comparatively little. The Clearing House exchanges still show that, compared with last year, we more than hold our own. It is generally conceded that matters in trade circles may be a little dull from now on till after election, but it is expected to be good from then right on till the close of the year. Some of the leading houses in this trade are making preparations to carry on a greater volume of business than ever before. The demand in the line of oil well supplies keeps up without intermission, and is, in fact, increasing.

J. O. L.

The Bureau of Ordnance.

Admiral O'Neil's Annual Report.

WASHINGTON, D. C., October 29, 1900.—The annual report of Admiral O'Neil, Chief of the Bureau of Ordnance, has been made public. The document is largely a review of the routine work of the Bureau during the past year, the most interesting feature being a statement concerning the present status of the armor controversy, which is the first official utterance since the bids opened on August 10 were rejected. On this point Admiral O'Neil says:

"Since the date of the last report the armor makers have delivered 42 tons of armor for each of the vessels of the 'Maine' class; 832 tons of armor for the 'Alabama,' completing the armor for that vessel; 837 tons for the 'Illinois,' leaving 418 tons to be delivered; 379 tons for the 'Wisconsin,' leaving 15 tons to be delivered, and 695 tons for the monitors 'Arkansas,' No. 8, 'Florida' and 'Wyoming,' leaving 1437 tons in process of manufacture. The total amount delivered during the year is 2869 tons.

"Practically all the armor remaining for these vessels has been forged and carbonized, and it is expected deliveries will have been completed within six months.

"There remains to be contracted for 7250 tons for the three battle ships of the 'Maine' class; 16,450 tons for the five battle ships of the 'Pennsylvania' and 'Virginia' classes; 11,250 tons for the six armored cruisers of the 'West Virginia' class, and 1860 tons for the three protected cruisers of the 'Milwaukee' class, making a total of 38,810 tons.

"Experiments to demonstrate the comparative resisting power of armor manufactured by the two processes now in vogue in this country have shown that while the so-called Krupp armor shows a marked superiority for the thicker armor, there is little or no difference in plates up to and including those of 5 inches in thickness. It is proposed, therefore, to divide the armor to be contracted for into two classes, the first consisting of face hardened armor over 5 inches in thickness; second, face hardened armor 5 inches and less in thickness, so that there will be required of the former 24,950 tons and of the latter 10,250 tons, the remainder being homogeneous armor. This arrangement will materially reduce the cost and at the same time afford the most efficient protection for our ships.

"Several experiments have been made with armor plates furnished by private manufacturers using processes unknown to the Bureau, but in no case has there been promise of improvement over present methods.

"During the year a number of ballistic tests have been made under the cognizance of the Bureau at the Indian Head proving ground of plates representing groups of armor manufactured for the Russian Government by the Carnegie and Bethlehem companies, using the so-called Krupp process. The ballistic qualities of these plates in comparison with reports of foreign tests show that the armor makers of this country are capable of reaching the highest standard in the art of manufacture of face hardened armor.

"At its last session Congress passed a law with regard to armor in the following terms, contained in the act of June 7, 1900—viz.:

"Armor and armament.—Toward the armament and armor of domestic manufacture for the vessels authorized by act of March 2, 1895; for those authorized by the act of June 10, 1896; for those authorized by the act of March 3, 1897; for those authorized by the act of May 4, 1898; for those authorized by the act of March 3, 1899, and for those authorized by this act, \$4,000,000. Provided, that the Secretary of the Navy is hereby authorized to procure by contract armor of the best quality for

any or all vessels above referred to, provided such contracts can be made at a price which in his judgment is reasonable and equitable; but in case he is unable to make contracts for armor under the above conditions he is hereby authorized and directed to procure a site for and to erect thereon a factory for the manufacture of armor, and the sum of \$4,000,000 is hereby appropriated toward the erection of said factory."

"On June 18 last, 11 days after the passage of the act referred to, the Department published an advertisement in leading papers in nine cities throughout the country, announcing that proposals would be received for naval vessels and fixing August 10, 1900, as the date for opening bids. On the date named the bids were publicly opened at the Navy Department. There were but three bidders for armor, while two other bidders bid upon armor bolts and nuts only.

"The forms of proposal issued by the Department called for bids on three classes of armor—viz., 'Class A,' consisting of improved face hardened armor of and over 5 inches in thickness; 'Class B,' consisting of face hardened armor less than 5 inches in thickness, and 'Class C,' consisting of hollow forgings and thin plates not face hardened, a different ballistic test being prescribed for classes A and B, that for Class A being the more severe.

"The bids received contained provisions which were not considered as satisfactory, and in consequence all bids were rejected by the Department and negotiations were opened with the bidders looking to more satisfactory arrangements. The matter is still under consideration."

The report describes the progress made in procuring smokeless powder and supplying it to the new battle ships. A sufficient quantity has been secured to give a complete outfit to the "Kearsarge," "Kentucky," "Alabama," "Wisconsin" and "Atlanta," and as rapidly as new vessels are commissioned or old ones recommissioned the Bureau will supply them also. It is stated that but little difficulty is now experienced by the manufacturers in meeting all the Bureau's requirements and no unfavorable qualities have thus far been detected in the navy smokeless powder.

The Government's efforts to secure a steady supply of satisfactory smokeless powder by the construction of a factory at Indian Head have been nullified by an explosion in the plant completed last May which wrecked the buildings and which will delay the manufacture of powder indefinitely. Admiral O'Neil's report was practically completed before the explosion, which occurred during the past week, and no intimation is given concerning the length of time necessary to rehabilitate the plant.

W. L. C.

The St. Lawrence Power Company.

On Friday, October 26, a party of capitalists, engineers and newspaper men left New York by special train on a trip of inspection of the great canal and plant of the St. Lawrence Power Company, William F. Zimmerman, vice-president and general manager of the company, being in charge of the party.

The train proceeded direct to Massena, N. Y., at which point the power station is being erected. T. A. Gillespie of Pittsburgh, who is building the canal, joined the party, and on Saturday morning they drove along the entire route, inspecting the various methods employed in the construction of the great water way. In the afternoon a special trip was made to the power house, which is well on toward completion. Saturday evening was given up to a banquet, and on Sunday the members of the party enjoyed the hospitality of Mr. Gillespie on his yacht "Lizzie," which steamed several miles up the St. Lawrence River. Among those present were: Henry C. Meyer, *Engineering Record*, New York; Charles T. Child, *Electrical Review*, New York; H. M. Brookfield, the Brookfield Glass Company; R. C. Hill, Madelra, Hill & Co.; H. P. Davison of New York; Chas. P. Tower, *Paper Mill*, New York; F. A. Halsey, *American Machinist*, New York; Colin K. Urquhart, *Paper Trade Journal*, New York; J. Bernard Walker, *Scientific American*, New York; F. R. Low, *Power*, New York; Fred. W. Schmitz, *The Iron Age*, New York; Charles Whiting Baker, *Engineering News*, New York; W. C. Andrews, *Electrical World and Engineer*, New York; Henry H. Porter, of New York; William F. Zimmerman, vice-president and general manager St. Lawrence Power Company; Warren A. Ransom, second vice-president St. Lawrence Power Company; T. A. Gillespie, the T. A. Gillespie Company, contractors, New York; W. M. Probasco, the Westinghouse Companies, Pittsburgh, Pa.

Edwin Bell & Sons Company, Youngstown, Ohio, makers of nail kegs, have taken the contract for supplying all the nail kegs to be used by the New Sharon Steel Company at Sharon, Pa.

MANUFACTURING.

Iron and Steel.

The American plant of the National Tube Company, at Youngstown, Ohio, resumed operations in full on Monday after a shut down of several months. The works employ 400 hands.

The Hilles & Jones Company of Wilmington, Del., have taken orders for a large number of machines. Among them are 25 punches and shears of various sizes, 13 of which are for the new shops of the Toledo Bridge Company, to which our Cincinnati correspondent has recently referred.

Hoopes & Townsend of Philadelphia, Pa., have contracted with the American Bridge Company to build a bar mill building 70 x 500 feet, on the line of the Trenton cut-off of the Pennsylvania Railroad.

It was the intention to close down the Edgar Thomson Steel Works of the Carnegie Steel Company at Bessemer for ten days or two weeks in order to make some needed repairs and improvements. Owing to rush of orders for rails, it has been decided to not shut down this plant until the Christmas holidays.

The Cambria Steel Company, Johnstown, Pa., have commenced the building of new ore bins at their furnaces Nos. 1, 2, 3 and 4. Each bin will be 12 feet square, sloping gradually from all four sides to a small opening at the bottom. They are to be arranged in a row and 30 will be built at a start. Over the bins will extend a railroad track. From the bins the trucks of ore are to be run by cables to the blast furnaces and dumped into the buckets which hoist the ore to the top of the furnace.

It is reported that a tin plate mill is to be built at Morgantown, W. Va.

A new company have been incorporated at Warren, Ohio, with a capital of \$100,000, and will build a sheet mill at that place. The incorporators are W. A. Thomas of Niles, Ohio; James Patterson, Struthers, Ohio; J. E. McVey, H. M. Robinson and John T. Harrington, all of Youngstown. W. A. Thomas was formerly connected with Thomas Furnace Company, at Niles, while James Patterson was foreman of the sheet mill of the Struthers Iron & Steel Company, at Struthers, but which was taken over by the American Sheet Steel Company.

The Altoona Iron Company, Altoona, Pa., have notified their puddlers of a reduction in wages from \$4.25 to \$3 a ton, effective November 1.

It is understood that the Wheeling Steel & Iron Company, Wheeling, W. Va., will go into the manufacture of iron pipe. The concern are large makers of grooved and sheared iron skelp.

The rod mill of the Dillon-Griswold Wire Company, Sterling, Ill., has been temporarily laid off by the bursting of the large pulley of the finishing train. The pulley was 48 inches wide, weighed over a ton, and ran at a speed of 450 revolutions. No one was struck by the flying pieces of iron. The belt, 40 inches wide, snapped like a cord. Some damage was done to the building by the pieces of the belt and pulley.

The P. L. Kimberly Iron Company of Sharon, Pa., were legally dissolved on Tuesday, Oct. 30. This concern sold out last year their mills at Greenville and Sharon to the Republic Iron & Steel Company.

The International Iron & Steel Company have been incorporated in New Jersey, with a capital of \$3,000,000.

We can state officially that the report that the National Roofing & Corrugating Company have taken over the plants of the Whitaker Iron Works and the Wheeling Corrugating Company, both of Wheeling, W. Va., is untrue. No transfer of these plants has been made.

As already noted, a new sheet mill is to be built at Niles, Ohio. The name of the new concern is Niles Iron & Steel Company, and application for a charter has been made. The capital stock is \$100,000.

The employees of the Youngstown Works of the American Bridge Company, at Youngstown, Ohio, have been notified that their working hours have been reduced from nine and a half hours a day to nine hours, effective January 1. This is the second time that the employees of the above works have had their working hours reduced. On July 1 last the hours were reduced from ten to nine and a half per day. In neither case has there been any reduction in wages.

It is expected that on Monday, November 5, Haselton Furnace of the Republic Iron & Steel Company, at Haselton, near Youngstown, Ohio, will be started. The metal will be used in the new Bessemer plant at the Brown-Bonnell Works.

The Republic Iron & Steel Company have in contemplation the addition of more mills for making finished product at their Bessemer plant at the Brown-Bonnell Works in Youngstown, Ohio. When plans now under way have been completed this plant will consist of a 26-inch billet mill and 26-inch slabbing mill and an 18-inch small billet mill. It is proposed, however, to add additional mills for the rolling of finished product, and possibly a sheet bar mill may be installed.

We regret to state that the interesting experiments in course at the Tom Thumb Furnace, Point Marion, Pa., have temporarily been put a stop to, owing to an explosion on the 22d ult.

disastrously affecting the hot blast arrangement. Notwithstanding the stoppage, which is believed to be but of a few months' duration, the inventor is sanguine of the final outcome of the experiments at a later date, and which it is declared will prove the process to be a record breaker as regards the rapid production of ferro silicon.

The Forter-Miller Engineering Company, Westinghouse Building, Pittsburgh, have received an order from the Canton Steel Company, Canton, Ohio, for a large heating furnace.

The Tyler Charcoal Iron Tin Mills at Washington, Pa., have recently started up two more mills, giving this concern a four-mill plant in full operation. The entire product of this concern is handled by McClure & Co., tin plate and metals, 211-213-215 Second avenue, Pittsburgh, and 115 North Seventh street, Philadelphia.

The report of a strike of puddlers in the rolling mill of the American Car & Foundry Company at Bloomsburg, Pa., arose out of a difference in opinion as to the grading of some stock. On Monday, October 29, every puddling furnace was manned and in full operation.

The puddlers employed at the Altoona Iron Company, at Altoona, Pa., who have been notified of a reduction in puddling from \$4.25 to \$3, effective on November 1, claim they will go out on a strike if the reduction is made.

Wm. Wharton, Jr., Incorporated, Philadelphia, Pa., are making some improvements to their plant. A two-story brick and steel building 23 x 73 feet has been erected, replacing a frame building of the same size.

The Danville Bessemer Company, Danville, Pa., have sold a portion of their plant, consisting of the converting and blooming department, plate, angle and rail mills, to the Consolidated Superior Company, who will remove it to Sault Ste. Marie, Ontario, where it will be used in equipping their new plant and for the manufacture of construction material and shapes for the general Canadian market.

The Crane Company, manufacturers of wrought pipe and fittings, valves, &c., who now carry on extensive operations in widely separated plants in Chicago, are preparing to build large works on a 13-acre tract of land at Rockwell street and Ogden avenue, in that city. The Panhandle division of the Pennsylvania Railroad Company runs along one side of the property and arrangements are being made to have connecting tracks laid.

The Cambria Steel Company have posted notices at their blast furnaces at Johnstown, Pa., for men to go to work. There is a scarcity of labor in Johnstown.

Shenango Furnace of the Shenango Furnace Company at Sharpsville, Pa., which has been idle for several weeks on account of a strike, has resumed operations.

Machinery.

The Westinghouse friction draft gear which is to be built by the Westinghouse Air Brake Company, in their shops at Wilmerding, Pa., is expected to facilitate the hauling of longer and heavier freight trains. It is expected there will be a very heavy demand from the railroads for this type of gear.

The National Foundry Company, Erie, Pa., are making a number of improvements to their plant, which will considerably increase their capacity, and also allow them to make heavier machinery castings. A new 25-ton electric traveling crane will be installed.

The shops of the Oil Well Supply Company, at Oil City, Pa., were damaged by fire on October 27 to the extent of about \$50,000, covered by insurance.

Ernest Smith is establishing a machine shop at Port Townsend, Wash. Some of the machinery has already been installed.

The California Drill & Iron Works have been incorporated at Kern, Cal., with a capital stock of \$100,000, to build and operate a machine shop, manufacture rolling mills, &c. The incorporators are A. G. Stockett and W. H. O'Connor of Kern, and O. W. Strong and F. Wheeler of Los Angeles.

The Fisher Bagasse Furnace Company, New Orleans, La., were established two years ago for the manufacture of a patent furnace for the burning of bagasse. This is the name of the refuse cane after the sugar has been extracted from it, which has heretofore been a source of annoyance and trouble to the planter. The refuse is by the use of this furnace utilized as a steam maker, dispensing with the use of coal in the manufacture of sugar. Previously the matter was either burned or thrown into the Mississippi or its tributaries.

A two-story brick addition, 110 x 35 feet, has been made to the plant of the Woodbine Machine & Tool Company, Woodbine, N. J.

The Marine Vapor Engine Company and the Marine Engine Company have been absorbed by the Marine Engine & Machine Company of Harrison, N. J.

The reports that Wm. Tod & Co., engineers, founders and machinists, at Youngstown, Ohio, would sell out their plant to a combination to be formed in Youngstown, is untrue. No such action is contemplated by this firm.

The Creamery Package Mfg. Company have prepared plans for the erection of a foundry at 1142 to 1158 Sixteenth street, Chicago. They are manufacturers of refrigerating machines.

It is reported that the Mahoning Foundry & Machine Company may remove their plant from Youngstown to Niles, Ohio.

On Monday, October 29, the Morgan Engineering Company, at Alliance, Ohio, dedicated the large foundry which they have had under construction for some time and which has been finished. The main building is 300 feet long, 125 feet wide and 75 feet high from floor to roof. It is equipped with three cupolas and seven electric overhead travelling cranes. It is said to be one of the largest foundries ever built.

The Kingsford Foundry & Machine Works of Oswego, N. Y., report that they are very busy in all departments. Their centrifugal pumps are becoming very widely known, as several foreign shipments have been recently made and many unfilled orders still remain on the books. Their new boiler plant is fast nearing completion. The equipment will consist of three hydraulic riveters and the necessary small tools for use in connection with same. The main building will be 315 x 120 feet. A 30-ton electric crane with a span of 50 feet will traverse the entire length of the building. All machines are to be driven with independent motors.

The Weatherly Foundry & Machine Company of Weatherly, Pa., Frederick Bertolette, president, is one of the busy industries of that place. A brick extension 50 x 75 feet is to be built and the plant provided with every modern equipment.

The Atlas Engine Company of Indianapolis, Ind., are about to erect an addition to their works, the estimated cost of which, it is reported, will be \$30,000.

The Interstate Foundry Company of Cleveland, Ohio, have been incorporated by Martin Mueller, P. H. Larder, G. H. Ganson, F. S. Martin and H. B. Snively. The company have a capital stock of \$400,000.

Hardware.

The Kilbourne Mfg. Company, C. E. Kilbourne, manager and treasurer, Fair Haven, Vt., have recently enlarged their plant and made important additions to its equipment. They now have their own japanning, enameling and nickel plating outfits, electric lighting plant, and much special machinery for the economical production of their large line of hardware specialties and wire goods for household use. This concern have recently increased their line of mincing knives and now produce 25 distinct styles.

The auger works of Job T. Pugh, 3114-3120 Market street, Philadelphia, Pa., were established and have been in continuous operation since 1774. In later years a four-story brick factory was built in the rear at the corner of Thirty-first and Ludlow streets. The extensive growth of business now makes it necessary to further enlarge the works, and a two-story addition is now under way. This will make nearly 10,000 square feet of additional floor space. A new 100 horse-power boiler is to be installed, and the present electric plant is to be increased by a 200-light dynamo. Mr. Pugh manufactures the Black Twist augers and bits. The double twist auger was the invention of Benj. Pugh, and being made by hand was unpolished and of black surface, and became well known as the Black Twist auger. A full line of augers and bits are made, for which there is a large foreign as well as domestic demand.

The McCaffrey File Company, Philadelphia, Pa., have recently awarded a contract for an additional two stories to a part of their works. This will give them about 1600 square feet additional floor space for manufacturing. An extension is also being built to the present engine room, on completion of which it is proposed to install a new and larger engine.

The Commercial and Manufacturers' Association of Paducah, Ky., have issued a little pamphlet in which the favorable situation of that city for manufacturing enterprises, both as to the assembling of the raw material and the distribution of the finished products, is dwelt upon.

Scranton Bolt & Nut Company, Scranton, Pa., advise us that all departments of their plant have been running without cessation since the completion of the works last December. They have recently completed the erection of a 70-foot extension to their forging department, and the installation of additional bolt and nut machinery is now being made.

The Lincoln & Wood Company, Taunton, Mass., manufacturers of twist drills, have removed their business to a larger building on High street. The new building is two stories high, 140 x 40, and well lighted. They have put in a large amount of new machinery for the manufacture of twist drills and are prepared to furnish all kinds of twist drills, except taper shanks, which they will shortly be ready to manufacture.

Miscellaneous.

A mortgage for \$400,000 in favor of the Land Title & Trust Company of Philadelphia against the Clearfield Coal & Coke Company of that city was recorded at Hollidaysburg, Pa., on October 25. The mortgage covers 6532 acres of coal lands in Blair and Cambria counties, and also the entire town of Frugality, which is owned by the Clearfield Coal & Coke Company. The coal lands will be developed and coke ovens built by Philadelphia capitalists who control the company.

G. A. McKeel & Co. are building a factory at Jackson, Mich., to make hardware specialties. Their principal products will be

hub bands, felloe plates and other sheet metal parts for carriages. Heavy presses will be installed for stamping sheet metal. The building now being erected is a brick structure, 50 x 130 feet, one story high. Mr. McKeel has for five years been the mechanical designer for the Withington & Cooley Mfg. Company and is said to have original devices for working metal which are believed to be of great advantage to the new manufactory.

Joseph H. McClure & Son of Philadelphia have bought the Hackettstown Zinc Works at Hackettstown, N. J., and will dismantle the plant in the near future.

It is rumored that the Risdon Iron Works of San Francisco contemplate establishing a plant on the New Jersey coast within an hour of New York City. The Risdon Works occupies 35 acres of ground in San Francisco, and employs at its plant there more than 2500 men.

At the adjourned annual meeting of the Troy Malleable Iron Company, Troy, N. Y., the following directors were elected: John H. Whittemore, William A. Grippin, William Slescher, Jr., Edwin Veghte, Augustus Veghte. At the directors' meeting the following were elected: William A. Grippin, president; Waldo K. Chase, vice-president; Augustus Veghte, general manager and secretary; Edwin Veghte, treasurer; George C. Dowsland, superintendent.

The Palge Iron Works, whose plant covers a block on Kingsbury streets, extending from Ontario to Ohio streets, Chicago, was burned on the 27th ult. The works have been making a specialty of street railroad supplies. Some extensive improvements in the plant had but recently been finished. In a portion of the building considerable valuable machinery was stored which has been seriously damaged. It is estimated that the loss will amount to \$150,000, covered by insurance. It is expected that the company will rebuild their plant as speedily as practicable.

The Union Boiler Tube Cleaner Company of Pittsburgh, Pa., have been adjudged bankrupts, and the receiver was directed to pay the Union National Bank \$2000 in full for its claim. The bank held as collateral \$4049. The sale of assets of the company for \$5590 was confirmed.

The Pan Metallic Company of Buffalo, N. Y., have been incorporated with a capital of \$30,000 to deal in metal goods. A. H. Martin, R. E. Tinker, J. D. Ryan and M. C. Comstock, all of Buffalo, are among the directors.

A New Sheet Mill.—PITTSBURGH, PA., October 31, 1900.—(By Telegraph.)—It is understood that the proposed new sheet mill at Youngstown, with which L. E. Cochran is connected, will be a go. The new plant will likely be located near the present works of Youngstown Iron & Steel Roofing Company and Youngstown Stove & Range Company.

A furnace containing 100 tons of molten lead collapsed in the works of the National Smelting & Refining Company at South Chicago, Ill., on October 26. The workmen were at the time pouring it into ingots, but fortunately all escaped uninjured. The metal covered the greater part of the floor to a foot in depth.

The Johnstown Centennial has been the occasion for the publication of a memoir entitled "Early Iron Enterprises," from the skillful pen of James M. Swank, general manager of the American Iron and Steel Association. It is an intensely interesting account of the rise and decline of a number of charcoal furnaces and forges in the Juniata Valley, Western Pennsylvania.

The Mexico Jupiter Steel Company of Tampico, Mexico, recently incorporated with a capital of \$500,000, are reported as about to begin the erection of their plant at Tampico, and will soon be in the market for the necessary machinery and materials.

A dispatch from Halifax, N. S., says that American capitalists have purchased the steel ship repairing and boiler making plant of N. Evans & Sons at that port and are about to construct a large dry dock and steel ship-building plant there.

The borough of Wilkinsburg have accepted the offer of Andrew Carnegie of \$50,000 for the building of a free library in Wilkinsburg. The borough agrees to contribute \$5000 a year in support of the library.

The fiscal year of the Amalgamated Association of Iron, Steel and Tin Workers ended on October 31. On November 1 Thomas Mansell of Cambridge, Ohio, takes the place of I. Davis as assistant to the president. Mr. Davis will continue to manage the *Amalgamated Journal*, the official organ of the Amalgamated Association. Chas. Davis takes Chas. Ridd's place as vice-president for the Eighth District. The pending resignation of T. J. Shaffer, president, has not yet been acted upon by the advisory board.

The Iron and Metal Trades.

From all quarters come the reports of active buying of Foundry Irons, the tonnage already placed having been large, while there are still very important requirements unsatisfied. Some of the sales were effected at low prices, and, while no advance has yet taken place, it is a fact that a number of sellers have withdrawn, being well filled for some time to come. There has been some movement, too, in Bessemer Pig in Pittsburgh and in Basic Pig in Eastern Pennsylvania.

This activity in Pig Iron has caused a better feeling in all markets, and it is all the more trustworthy an indication of improvement since it is free from the suspicion of any rigging by any combination, association or consolidation.

The demand from Europe has fallen off considerably and few additional sales for export are recorded. Even if the outlet in that direction should be slightly choked, a moderate revival in the home requirements would offset the loss many times over.

The Pennsylvania Railroad order for Steel Rails has been definitely placed, the Carnegie Steel Company receiving 38,000 tons, Cambria 28,000 tons, Federal 24,000 tons, Pennsylvania 24,000 tons, National Steel Company 18,000 tons and Lackawanna 12,000 tons. Besides this some other orders have been received, so that it is estimated that the total tonnage thus far placed is about 400,000 tons. Inquiries are being received and, it is believed, will soon lead to business. There are rumors that an advance in the price may be announced at an early date.

The English newspapers admit that builders in this country have captured the bridge contracts for the Uganda Railway in South Africa, the quantity involved being about 8000 tons. As yet, however, this has not been authoritatively confirmed here. It is true, however, that the American Bridge Company have lately taken a small but significant order which is likely to create a stir in Germany. It is for the erection of shops at Bremen for the North German Lloyd Steamship Company. The quantity involved is about 800 tons.

The Plate trade has had a very great surprise in the form of an advance to 1.25c., Pittsburgh, for Tank, brought about by an agreement among the mills. Some very heavy sales have been made East and West during the past two weeks, the requirements for shipbuilding being particularly large.

The demand for Structural Material generally is quite active, and the Bar mills in all parts of the country are rushed with work. The Wire trade is reported to be active, and there is some scarcity of spot Tin Plate in Chicago.

As we go to press the result of the meeting of the Steel Billet makers in New York has not yet been announced.

A Comparison of Prices.

At date, one week, one month and one year previous.

Advances Over the Previous Month in Heavy Type. Declines in Italics.

	Oct. 31, 1900.	Oct. 23, 1900.	Oct. 2, 1900.	Oct. 4, 1899.
PIG IRON:				
Foundry Pig, No. 2, Standard, Philadelphia	\$15.00	\$15.00	\$15.00	\$22.75
Foundry Pig, No. 2, Southern, Cincinnati	12.00	12.25	13.00	20.75
Foundry Pig, No. 2, Local, Chicago	14.50	14.50	14.50	23.00
Bessemer Pig, Pittsburgh	13.15	13.00	13.00	23.75
Gray Forge, Pittsburgh	12.75	12.25	12.75	21.00
Lake Superior Charcoal, Chicago	17.60	18.00	18.00	25.00
BILLETS, RAILS, ETC.:				
Steel Billets, Pittsburgh	18.00	16.75	16.50	38.50
Steel Billets, Philadelphia	20.00	20.00	19.25	40.50
Steel Billets, Chicago	19.50	19.50	19.50	
Wire Rods, Pittsburgh	33.00	33.00	33.00	46.00
Steel Rails, Heavy, Eastern Mill	26.00	26.00	26.00	33.60
Spikes, Tidewater	1.45	1.45	1.40	2.60
Splice Bars, Tidewater	1.25	1.25	1.25	2.25
OLD MATERIAL:				
O. Steel Rails, Chicago	10.00	10.50	10.00	19.00
O. Steel Rails, Philadelphia	14.00	14.00	12.50	21.50
O. Iron Rails, Chicago	16.00	16.00	13.50	30.00
O. Iron Rails, Philadelphia	16.50	16.50	15.50	25.00
O. Car Wheels, Chicago	15.00	15.50	16.00	20.00
O. Car Wheels, Philadelphia	16.50	16.50	15.50	20.50
Heavy Steel Scrap, Chicago	9.50	10.00	10.00	18.00
FINISHED IRON AND STEEL:				
Refined Iron Bars, Philadelphia	1.25	1.25	1.25	2.10
Common Iron Bars, Youngstown	<i>1.20</i>	1.25	1.25	2.25
Steel Bars, Tidewater	1.25	1.20	1.20	2.40
Steel Bars, Pittsburgh	1.10	1.10	1.05	2.50
Tank Plates, Tidewater	1.35	1.20	1.20	3.00
Tank Plates, Pittsburgh	1.25	1.10	1.05	2.90
Beams, Tidewater	1.65	1.65	1.65	2.40
Beams, Pittsburgh	1.50	1.50	1.50	2.25
Angles, Tidewater	1.55	1.55	1.55	2.40
Angles, Pittsburgh	1.40	1.40	1.40	2.25
Skelp, Grooved Iron, Pittsburgh	1.45	1.40	1.40	2.25
Skelp, Sheared Iron, Pittsburgh	1.50	1.50	1.47½	2.50
Sheets, No. 27, Chicago	3.05	3.05	3.05	3.15
Sheets, No. 27, Pittsburgh	2.80	2.80	2.80	3.15
Barb Wire, f.o.b. Pittsburgh	2.80	2.80	2.80	3.40
Wire Nails, f.o.b. Pittsburgh	2.30	2.30	2.30	2.80
Cut Nails, Mill	1.95	1.95	1.95	2.50
METALS:				
Copper, New York	16.75	16.75	16.67	18.37½
Spelter, St. Louis	4.00	4.00	4.00	5.35
Lead, New York	4.37½	4.37½	4.37½	4.60
Lead, St. Louis	<i>4.25½</i>	4.25½	4.32½	4.50
Tin, New York	27.85	27.50	29.65	32.25
Antimony, Hallett, New York	9.50	9.50	9.50	9.75
Nickel, New York	55.00	55.00	55.00	56.00
Tin Plate, Domestic Bessemer, 100 lbs., New York	4.19	4.19	4.19	4.82½

Chicago. (By Telegraph.)

Office of The Iron Age, 1205 Fisher Building,
Chicago, October 31, 1900.

Trade is much more active. Buyers are more generally inclined to discount the election. Heavy orders have been placed for Rails, Bars, Plates and other finished products. The advance just made by manufacturers of Plates is taken as an indication of what may be expected in other lines. The feeling is strong that a great deal more business will come out after the election and that the remainder of the year will witness a heavy volume of trade in all lines. Hardware is very active. Wire products have seldom been in greater demand. Tin Plates are so scarce that spot lots command a premium over old prices.

Pig Iron.—The transactions of the week as far as can be learned have included no very large lots. Quite a number of orders for 1000 tons have been placed, and a brisk business is reported in small lots for immediate shipment. A great deal of tonnage is under negotiation, however, and may be closed at any time. Large consumers are getting very tired of the annoyances attending the frequent placing of small orders, with the delays in shipments, and heavy buying is expected from them immediately after the election, if not before. Concessions have been made on some grades during the week, but it is asserted that reports in circulation naming extremely low prices are not correct. Furnace companies reported to have made very low sales at other points are holding their agents here firmly to quotations. It is claimed that current prices are now representing absolute cost, and if any further reduction were to be made additional furnaces would be put out of blast. Quotations are as follows:

Lake Superior Charcoal	\$17.00 to \$17.50
Local Coke Foundry, No. 1	15.00 to 15.50
Local Coke Foundry, No. 2	14.50 to 15.00
Local Coke Foundry, No. 3	14.00 to 14.50
Local Scotch, No. 1	15.00 to 16.00
Ohio Strong Softeners, No. 1	16.00 to 16.50
Southern Silvery, according to Silicon	15.50 to 16.50
Southern Coke, No. 1	14.50 to 15.00
Southern Coke, No. 2	14.00 to 14.35
Southern Coke, No. 3	13.50 to 14.10
Southern Coke, No. 1 Soft	15.00 to 15.35
Southern Coke, No. 2 Soft	14.00 to 14.35
Foundry Forge	12.75 to 13.50

Gray Forge and Mottled.....	12.25 to 12.50
Southern Charcoal Softeners, according to Silicon.....	15.00 to 17.00
Alabama and Georgia Car Wheel.....	20.00 to 20.35
Malleable Bessemer.....	14.50 to 15.00
Standard Bessemer.....	14.50 to 15.00
Jackson County and Kentucky Silvery, 8 per cent. Silicon.....	18.00 to 19.00

Bars.—Both Iron and Steel Bars are in strong demand, and some large contracts have been placed. The car builders are prominent buyers, but other important consuming interests are also coming into the market. Business is in so much better condition than a month since that manufacturers feel more encouraged than ever over the prospects of a heavy trade for the remainder of the year. A great deal of business is still known to be deferred until after the election. Mill shipments of Common Iron are quoted at 1.30c. to 1.35c.; Soft Steel Bars, 1.30c. to 1.35c., and Hoops, 1.95c., base, Chicago. Jobbers report a lively trade from stock. Mills, however, are not making deliveries according to contract, and stocks are hard to keep up. Large consumers are pulling upon the jobbers for shorts, and this is making heavy inroads on the assortment of sizes. Store prices are unchanged at 1.65c. to 1.75c. for Common Iron, 1.50c. to 1.65c. for Steel, and 2c. to 2.20c. for Hoops.

Billets.—A sale of 1000 tons of Billets is reported. Quotations continue at \$19.50 to \$20, but manufacturers are looking for higher prices in the near future.

Structural Material.—Car builders have been very good customers of Structural Steel manufacturers, taking large quantities of Beams, Channels, Angles, Zees and Universal Plates. The demand from the building trade in this city continues extremely light, but a good run of small orders is reported from outside towns. The cities in the Northwest will do considerable building this winter. A building at Minneapolis, to take 1000 tons, is to be pushed to completion regardless of cold weather. Some very large building projects in this city are awaiting the result of election. It will not be long after that until a number of them will take definite shape. Quotations, mill shipments, are as follows: Beams, Channels and Zees, 15 inches and under, 1.65c.; 18 inches and over, 1.75c.; Angles, 3 inches and over, 1.55c.; Angles, under 3 inches, 1.35c.; Tees, 1.70c.; Universal Plates, 1.40c. From local yards small lots of Beams and Channels quoted 2.15c. to 2.35c.; Angles, 1.80c. to 1.90c. rates, and Tees, 2c. to 2.20c.

Plates.—Buyers have been given quite a jolt this week by a sudden advance. The manufacturers quite unexpectedly got together and advanced prices. A very good business has been doing, both in mill shipments and small lots from store. Contracts for at least 10,000 tons have been taken here during the past two weeks. Mill shipments of Tank Plates, $\frac{1}{4}$ inch and heavier, are now quoted at 1.40c., Chicago, minimum; Shell, 1.45c.; Flange, 1.50c.; Marine, 1.55c., minimum. The jobbers have marked up store prices and quote small lots from stock at 1.60c. to 1.70c. for Tank, and 2c. for Flange.

Sheets.—Large buyers are displaying their confidence in the future by placing heavy orders for mill shipments. It is believed that the past week is the heaviest in tonnage of the orders placed for many months. Inquiries are numerous, and a great deal more business is pending. Mill shipments of No. 27 Black Sheets are still quoted at 3.05c., Chicago, and Galvanized Sheets at 75 per cent. off. Jobbers are having an excellent trade from stock, especially in Galvanized Sheets, which are in rather limited local supply. They continue to quote small lots from store at 3.10c. to 3.15c. for No. 27 Black, 2.10c. to 2.20c. for No. 16, 1.85c. to 2c. for Nos. 10 to 14, and 70 and 5 to 70 and 10 off for Galvanized.

Merchant Steel.—Current trade is confined almost entirely to small lots, nevertheless a contract is occasionally being placed by some large consumer who has not yet covered his season's requirements. Some conditional business is being received subject to cancellation in case of an unfavorable result of the election. Mill shipments, Chicago delivery, are quoted as follows: Smooth Finished Machinery Steel, 1.75c. to 1.90c.; Smooth Finished Tire, 1.75c. to 1.95c.; Open Hearth Spring Steel, 2.15c. to 2.40c.; Toe Calk, 2.40c. to 2.60c.; Sleigh Shoe, 1.70c. to 1.90c.; Cutter Shoe, 2.40c. to 2.60c. Ordinary grades of Crucible Tool Steel are quoted at 6c. to 7c.; Specials, 13c. upward.

Merchant Pipe.—An excellent business is in progress, with some scarcity reported in certain sizes. Manufacturers' prices, random lengths, are as follows:

	In carloads.	Less than carloads.
	Blk. Galvd.	Blk. Galvd.
$\frac{1}{4}$ to $\frac{1}{2}$ inch and 11 to 12 inches.....	59.2 46.2	54.9 40.9
$\frac{3}{4}$ to 10 inches.....	66.7 53.3	61.9 48.9
Boiler Tubes are very firmly held, no concessions being made on the recent schedule. Quotations are continued as follows:		
1 to 2 $\frac{1}{4}$ inches, inclusive.....	Steel. 50	Iron. 40
2 $\frac{1}{4}$ inches.....	50	42 $\frac{1}{2}$
2 $\frac{1}{2}$ to 5 inches.....	60	50

Cast Iron Pipe.—The unusually open weather prevailing so late in the season is operating very favorably for the Cast Iron Pipe trade. Numerous orders are constantly being received for small lots to finish pressing work for this year.

Coke.—The demand from foundries keeps up very well, and considerable contracting is now being done for future delivery. Quotations for 72-hour Coke are \$4.50 to \$5, Chicago.

Rails and Track Supplies.—The railroad companies are now booking Rail orders for next year's delivery, and a very good tonnage has been entered during the week. The orders coming from the different railroad companies are larger than usual and Rail manufacturers believe that the tonnage required for next year will be fully as great as in any previous year, if not larger. The enormous traffic enjoyed by the railroads is wearing their Rails much more rapidly than had been expected, and the renewal demand is therefore beyond that of any former year. It is intimated that prices of Standard Sections will shortly be advanced, report having it that the advance is to occur on November 1. Light Rails are in continued good demand, the business being so heavy that the South Chicago Rail mill will be obliged to run a portion of the time on Light Sections to relieve the Milwaukee works. The South Chicago works resumed operations on Monday of this week and are now expected to run steadily. Heavy Sections are quoted at \$26, and Light Sections at \$25.50 to \$28, according to weight. Track Supplies are quoted as follows: Splice Bars, 1.30c. to 1.35c.; Spikes, 1.75c. to 1.85c.; Bolts, with Hexagon Nuts, 2.10c. to 2.20c.; Square Nuts, 2c. to 2.10c.

Old Material.—The situation in Old Material is peculiar. Old Iron Rails are held at very high prices, which are \$2 or \$3 above what consumers can afford to pay for them at present prices of new products. The railroad companies holding the limited quantities now available, however, are taking advantage of the situation and forcing buyers to pay these excessive rates. The same thing is true to a somewhat less extent as to Iron Fish Plates and Wrought Scrap. Other classes of material are in abundant supply, with possibly the exception of Cast Scrap, which still preserves a remarkably high value compared with Pig Iron. The demand for Old Material has not been active of late and lower prices are looked for as stocks accumulate in the hands of railroad companies and dealers. The following are approximate quotations per gross ton:

Old Iron Rails.....	\$16.00 to \$16.50
Old Steel Rails, mixed lengths.....	10.00 to 10.50
Old Steel Rails, long lengths.....	13.00 to 13.50
Relaying Rails.....	18.00 to 20.00
Old Car Wheels.....	15.00 to 15.50
Heavy Melting Steel Scrap.....	9.50 to 10.00
Mixed Steel.....	8.00 to 9.00
Iron Fish Plates.....	15.50 to 16.00
Steel or mixed do.....	9.50 to 10.00
Iron Car Axles.....	18.50 to 19.00
Steel Car Axles.....	15.00 to 15.50
No. 1 Railroad Wrought.....	14.50 to 15.00
No. 2 Railroad Wrought.....	12.50 to 13.00
Shafting, Iron and Soft Steel.....	17.00 to 17.50
No. 1 Dealers' Wrought.....	9.00 to 9.50
No. 1 Mill.....	7.50 to 8.00
No. 2 Mill.....	6.00 to 6.50
No. 1 Bushelling.....	8.50 to 9.00
No. 2 Bushelling.....	7.50 to 8.00
Iron Car Axle Turnings.....	9.00 to 9.50
Soft Steel Axle Turnings.....	8.00 to 8.50
Machine Shop Turnings.....	7.00 to 7.50
Wrought Drillings.....	6.00 to 6.50
Cast Borings.....	4.00 to 4.50
Mixed Borings and Turnings.....	4.50 to 5.00
No. 1 Rollers, cut.....	8.50 to 9.00
Boiler and Ship Scrap.....	8.00 to 8.50
No. 1 Cast.....	12.00 to 12.50
No. 2 Cast.....	8.50 to 9.00
Railroad Malleable Cast.....	12.00 to 12.50
Agricultural Malleable Cast.....	10.00 to 10.50

Metals.—Prices of metals are very steady. Lake Copper is held at 17c., and Casting Brands, 16 $\frac{1}{4}$ c. Desilverized Pig Lead is quoted at 4.32 $\frac{1}{2}$ c., and Corroding, 4.42 $\frac{1}{2}$ c. in 50-ton lots.

D. Evans, who for some time has been connected with the late D. L. Cobb, has been placed temporarily in charge of the local agency of the Sloss-Sheffield Steel & Iron Company, 1439 Monadaock Building, Chicago.

Professor Charles L. Norton of Harvard University has made an illustrated report of much practical value to the Associated Factory Mutual Companies of New England, bearing on the utility of various forms of prismatic and ribbed glass for the diffusion of light through rooms containing insufficient daylight. His tests show that if windows of the common type in mills, workshops, schoolrooms or offices, now fitted with plane glass be reglazed in the upper half only with ribbed or prismatic glass they will yield on a bright day an addition of more than 50 per cent. of effective light, or on dark days a larger ratio. The report is introduced by a statement from Edward Atkinson.

Philadelphia.

Office of *The Iron Age*, Forrest Building,
PHILADELPHIA, PA., October 30, 1900.

A decided improvement appears to have struck the Iron trade. A great deal of buying has been done during the past few days, and prices in all lines are firmer, and in most cases slightly higher. The increased activity is due to the pressing requirements of consumers, although in a few instances those who have been waiting for the election have discounted that event by making large purchases. It would probably be somewhat hazardous to conclude that prices are going to make an important advance, but it is tolerably clear that the trend will be in that direction during the coming month, and that the close of the year will be likely to show as much firmness as the close of 1899 showed weakness. We have had a full year of practically a continuous decline in prices, but if appearances are not deceptive we are surely on the threshold of increased confidence, broader markets and steady if not higher prices. The demand will certainly be larger, the amount of work recently given out and ready to be given out being sufficient to make a very satisfactory market. The matter of prices is somewhat more indefinite. We may have to meet a falling off in the foreign demand, or we may have a larger business than ever, and prices will depend a great deal upon that end of the market. Late advices from Europe indicate decided weakness, both in Great Britain and on the Continent, and although the United States can beat them in prices, there may be an unwillingness among foreigners to make commitments until they see a little further ahead. Temporarily, therefore, there is some uncertainty in regard to foreign business, but it is possible that recovery on this side may lead to renewed confidence in European markets. There is, however, a large capacity for Iron and Steel making ready to be utilized at once, providing that prices are such as to offer inducements, so that with these contingencies in prospect it will not be safe to calculate on any material advance from to-day's figures. The change so far is of a sound and hopeful character, and with judicious handling there should be a good foundation for a profitable business during the coming year.

Pig Iron.—Low prices are still in evidence, but the general tone of the market is undoubtedly stronger. It is difficult to account for the great disparity in prices, except on the ground that very diverse ideas are held in regard to the course of the market in the near future. The difference in prices is practically \$1 to \$1.50 per ton in some cases. There may be some difference in quality, but as the Iron is sold on analysis there cannot be much difference. Sales are reported in some cases at close to \$14 for No. 2 X Foundry, delivered, while in others nothing less than \$15.25 to \$15.75 will dislodge it. The low prices named, however, were not for deliveries in this immediate vicinity, although the locations were about equivalent as regards freights. Locally, more money is asked for pretty nearly all grades, and in some instances 25c. advances have been paid. Buying has been on quite a large scale during the past week, and it is thought that November will be a month of still greater activity. Some are of opinion that prices will again be moved upward, while others are disposed to sell freely, considering \$15.50 to \$16 as high as can be maintained for No. 2 X with any reasonable degree of safety. Basic Iron is being inquired for in lots of 2000 to 5000 tons each, \$13.75 bid, and \$14 to \$14.25 asked, with at least one sale at a little over \$14; but, as we said before, prices cover a wide range, but as a rule come within the following limits for Philadelphia or nearby points: No. 1 X Foundry, \$16 to \$17; No. 2 X Foundry, \$15 to \$15.75; No. 2 Plain, \$14.25 to \$14.75; Standard Gray Forge, \$13.50 to \$14; Ordinary Gray Forge, \$12.50 to \$13; Basic, \$13.75 to \$14; Low Phosphorus, nominal, \$22 to \$22.50.

Billets.—The market is very unsettled, the asking price for Bessemer being \$20 to \$20.50 for this year's delivery, while for next year \$22 and upward is demanded, being very much above buyers' ideas. Basic Open Hearth Steel is quoted at from \$21 to \$22, but buyers are not prepared to meet the full advances which are asked, although Steel appears to be wanted.

Plates.—The demand has been very active during the week, and some of the large mills have reached a point at which they have been compelled to turn down orders. The heaviest buyers are ship and bridge builders, but there is a good demand from all sources. Prices are higher, 1.30c. at mill being an inside figure, and for the smaller class of orders 1.35c. to 1.40c. is quoted. Prospects for the winter months are excellent, and 1.5c. is beginning to be talked of as a probable price in the near future. To-day's prices are about as follows for deliveries at nearby points: Plates, 1/4-inch and thicker, 1.35c. to 1.40c.; Universals, 1.40c. to 1.45c.; Shell, 1.45c. to 1.50c.; Flange, 1.60c. to 1.65c.; Charcoal Iron

Plates, C. H. No. 1, 2.25c.; Best Flange, 2.75c.; Fire Box, 3.25c.

Structural Material.—Plenty of business around, and mills are very comfortably fixed as regards orders on the books. All danger of a shortage of work during the winter months seems to have passed away, and the feeling is extremely confident. Prices are steady and unchanged: Angles, 3 inches and upward, 1.65c. to 1.75c.; less than 3 inches, 1.35c. to 1.40c.; Beams and Channels, 15-inch and upward, 1.65c. to 1.75c.

Bars.—The demand is surprisingly active, and mills are now quoting 1.30c., f.o.b.; some, in fact, quote 1.35c., while a few who are somewhat belated are still doing business at 1.25c. (mill price). There is a heavy demand, however, and it would be difficult to do better than 1.30c. for good Iron in carload lots and upward. Steel Bars are quoted at 1.25c. to 1.30c., and are also very firm at the advance.

Sheets.—There is a good demand for all the numbers, the higher numbers being specially strong and active. Mills are full of work, and have all they can do to meet the calls that are made for quick deliveries. Prices unchanged as follows for best Sheets (common Sheets two-tenths less): No. 10, 2.25c.; No. 14, 2.35c.; No. 16, 2.56c.; Nos. 18-20, 3c.; Nos. 21-24, 3.10c.; Nos. 26, 27, 3.20c.; No. 28, 3.30c.

Old Material.—There is a much better market, as nearly all the mills in the district are taking in material, when it can be had at last week's prices. In most cases advances of 25c. to 50c. per ton are demanded, and generally paid when stocks in yards are running short. Sales have been made as follows: Choice Railroad Scrap at \$16.50, Steel Turnings at \$11.20, and \$17 bid for Gun Carriage Scrap, and \$14.50 for Steel Rails. Bids and offers are about as follows for deliveries in buyers' yards: Choice Railroad Scrap, \$16 to \$16.50; No. 1 Yard Scrap, \$13 to \$14; No. 2 Light Scrap, \$10.75 to \$11.50; Machinery Cast, \$13.50 to \$14.50; Heavy Steel Scrap, \$14 to \$14.25; Old Iron Rails, \$16.50 to \$17; Old Steel Rails, \$14 to \$15; Wrought Turnings, \$8.50 to \$9; Cast Borings, \$6.75 to \$7.25; Old Car Wheels, \$16.50 to \$17; Iron Axles, \$18 to \$19; Steel Axles, \$17 to \$18.

Cleveland.

CLEVELAND, OHIO, October 30, 1900.

Iron Ore.—Estimates made as to the movement of Iron Ore from the upper lake region during the month of October indicate that the total shipment for the season to date has been upward of 17,000,000 tons. This promises very light business for Ore carriers from now on, as the Ore yet to be moved can be cared for with ease by the contract tonnage that will operate to Lake Michigan for at least 15 days yet, some boats being under charter until the season is over. In view of the prospect many vesselmen are either tying their boats to the docks now or are sending them after grain. Some of the smaller tonnage is being withdrawn from Ore and sent after lumber, while other boats of the same size are going to the Atlantic Coast for the winter trade. Many vessels which had cargoes of Ore promised waited so long upon the shippers to furnish them that the owners became impatient and ordered their vessels into other lines of trade. The Ore trade on the lakes, therefore, is beginning to lag greatly, and November 1 will practically see the end of it. Already attention is being paid to the prospective movement and freights for next season. Vessel owners are backward about talking of contracts, not caring to make any such just now. Contracts made at this time mean that the owners can get nothing but the lowest rates, and the owners hope that conditions arising later in the year may be more favorable to them. They have to contend against the Rockefeller-Carnegie agreement, the present low wild rates, and the possible light demand for Ore next season in talking of future freights. The shippers, however, are anxious and are urging freight talk. Nothing is being done in the way of sales, and will not be until the Ore Association holds a meeting, which is not expected until early in December.

Pig Iron.—The increased activity in Finished Material seems to have permanently bettered the Pig Iron market, for the improved conditions noted a week ago continue. Sales this week have been heavier than they were before, although the buyers display a tendency to steer clear of long time contracts, which was a feature a week ago. Buyers are willing to cover their needs for four months, but beyond that they hesitate. Present prices, however, seem alluring to some to cover even as far as a half year ahead. Sales this week have been numerous in lots ranging from a carload to 2000 tons. The prices hold firm at \$14 for No. 1, and \$13.50 for No. 2 Foundry, Valley furnace. There are but few signs of activity in Bessemer Pig just now, the buyers and the

furnacemen being at a deadlock still as to prices. Most of the energy of the Pig Iron producers is now being directed toward lowering the price of Ore and of Coke.

Finished Material.—There is a suggestive unanimity in the quotation of 1.25c. on Plates. Heretofore the larger mills have held out for 1.15c. on Plates, while the smaller ones always made it known that they were willing to do business at 1.10c., and if proper inducements were made as to the amount of Steel they would consider a bid of 1.05c. This is the reported result of a long conference between the mill men. The mills are making the congested condition of their Plate plants the occasion for this advance in price, and already some concerns have accepted the price. One order was placed Saturday for 1000 tons of Plates for bridge work at 1.25c. Inquiries have been made in the last two days for 4000 tons of Plates that will be closed before the week is out, deliveries to be made before February 1. Bridge work is especially heavy just now, that seeming to be the most interesting thing in the market. There is an enormous demand for Bars just now. Inquiries have been made for 1500 tons, and for another lot of 2000 tons that will be placed in a day or so. An order was also placed yesterday for 500 tons to go into the breakwater in Cleveland harbor. The material ordered was to have been shipped at once, which condition the larger mills could not fulfill, hence the orders went begging. The prices hold firm at 1.15c. and 1.20c., with the top figure more nearly the market. There is a moderate demand for Shapes. The order for Bridge Plate will carry with it an order for 1500 tons of Shapes, and as other large orders for Bridge Plate are in sight the demand for Shapes is better than it has been. The prices hold at the association figure. Nothing is being done in Billets.

Old Iron.—The demand for Scrap has been slightly better this week than lately. The dealers have been buying moderately, having a good stock on hand, and have been able to sell larger quantities than they have been doing, the mills demanding more of it. Old Rails are not as much in demand as they were, but the price has not weakened. Stove and Machine Cast are meeting with small sales. Iron Axles and Car Wheels are also slightly in demand.

Cincinnati. (By Telegraph.)

Office of *The Iron Age*, Fifth and Main streets, {
CINCINNATI, October 31, 1900. }

The past week has been the most active one in Pig Iron circles of any similar period for quite a number of months. It is Southern Iron which is selling, and it is simply impossible to harmonize the different stories as to prices on which this selling is being done. Buyers seem to have suddenly become convinced that there is nothing for them in postponing action until after the election, and they have poured into the field so strongly as to cause quite a number of furnaces to decline to sell on the current minimum basis. There is still Iron offering on the basis of \$9.25, Birmingham, for No. 2 Foundry, and some interests who cannot sell No. 2 at that price are letting go other grades of which they have a surplus on that basis; \$8.25 for Gray Forge and No. 4, and \$8.75 for No. 3, Birmingham, are still being quoted. There are some instances here of agencies who represent two or more furnaces being forced to quote from \$9.25 to \$10.25 for No. 2, Birmingham, thus showing that the weakness is not a generally acknowledged fact. To-day there is a decidedly better feeling, and a shrinking away from the lower basis as quoted. An active week is looked for, and better prices are not at all unlikely. Freight rate from Birmingham is \$2.75 to this point; from the Hanging Rock district, \$1. We quote, f.o.b. Cincinnati:

Southern Coke, No. 1.....	\$13.00 to \$14.00
Southern Coke, No. 2.....	12.00 to 13.00
Southern Coke, No. 3.....	11.50 to 12.25
Southern Coke, No. 4.....	11.00 to 11.75
Southern Coke, No. 1 Soft.....	13.00 to 14.00
Southern Coke, No. 2 Soft.....	12.00 to 13.00
Southern Coke, Gray Forge.....	11.00 to 11.75
Southern Coke, Mottled.....	11.00 to 11.75
Ohio Silvery, No. 1.....	16.50 to 17.00
Ohio Silvery, No. 2.....	15.50 to 16.00
Lake Superior Coke, No. 1.....	15.00 to 15.50
Lake Superior Coke, No. 2.....	14.00 to 14.50
Lake Superior Coke, No. 3.....	13.00 to 13.50

Car Wheel and Malleable Irons.

Standard Southern Car Wheel, chilling grades.....	\$20.75 to \$21.25
Standard Southern Car Wheel, No. 2.....	19.75 to 20.25
Lake Superior Car Wheel and Malleable.....	19.00 to 20.00

Plates and Bars.—No change in the general tone of the market, and quotations are unchanged, though hardly firmly held. We quote, f.o.b. Cincinnati: Iron Bars, in carload lots, 1.45c., with half extras; in small lots, 1.70c., with full extras; Bar Steel, in carload lots, 1.35c., with half extras; in small lots, 1.70c., with full extras. Iron Bar Angles, 1½ x 3-16 inch and larger, in car lots,

1.70c., in small lots, 2.20c.; Sheets, No. 10, 2.20c.; No. 27, Steel, 2.95c.; Plates, 1.65c. to 2c.

Old Material.—Market quiet and unchanged. Dealers' buying prices per gross ton, f.o.b. Cincinnati, are about as follows: No. 1 Wrought Railroad Scrap, \$11 to \$12; Cast Railroad and Machine Scrap, \$10 to \$11; Iron Axles, \$14 to \$15; Iron Rails, \$12 to \$13; Car Wheels, \$14 to \$15.

Rogers, Brown & Co. of Cincinnati and branch houses have been given the sole selling agency of the Rome Charcoal Car Wheel Iron. This brand is made by the Rome Furnace Company, whose furnace is located at Rome, Ga., and the Eagle Iron Company, with furnace at Attalla, Ala. The Rome brand has been on the market for several years and is widely used by Car Wheel makers.

Birmingham.

BIRMINGHAM, ALA., October 29, 1900

Your correspondent was told more than once during the past week, "You can report a better demand with increased sales, but prices are no better." He found that prices were not only no better, but in some cases had received further bleeding wounds. At one interest access was given your correspondent to the registered order book for the week, and the following transcript was made—viz.: No. 1 Foundry sold at \$11.52; No. 2 Foundry, at \$10.25 and \$10.50; No. 1 Soft, at \$12.75, \$11.97, \$11.50, \$11.75; No. 2 Soft, at \$11.09, \$10.54, and \$10.25; No. 2 Silvery, at \$12.22; No. 4 Foundry, 300 tons at \$9.25; Gray Forge at \$9.25, \$9 and \$8.85. All these prices are net prices to seller. None of the orders were of any magnitude, and every one had a tag attached, "Please be sure and give our order prompt shipment." One large interest handed to your correspondent their mail orders for the day for inspection, and he found on each and every one of them this special request for prompt shipment. It is significant inasmuch as it confirms the oft repeated assertions that stocks in melters' hands were simply nominal. One interest reported that all their sales for the week were on telegraphic orders and price was left for the seller to fix, but the same tag, "give prompt shipment," was affixed to each order. The rock bottom prices on iron during the week are not obtainable. While your correspondent is satisfied that some No. 2 Foundry was sold below \$10, he has failed to get the facts necessary to warrant him in announcing it as a certainty. The report of a sale at \$9.25 has no credence here. Quotations as given by sellers are for Gray Forge, \$9 to \$9.50; No. 3 Foundry, \$9.50 to \$10; No. 2 Foundry, \$10 to \$10.50. One will note the leeway given for a rise and fall on each grade. The inquiry has certainly increased. On one day it amounted to 25,000 tons at one interest. Sellers are not offering of their own volition for delivery beyond January; but if an insistent buyer enters the market, efforts are made to accommodate him. But it is the buyer for nearby delivery whose favors are more anxiously sought.

As for export, there was some inquiry and some transactions, but on only a limited scale. Some ocean room was offered for November and December and promptly taken. Domestic shipments have been brisk and the prospects for a continuance are good. One interest, it is now rumored, have fully sold all they can deliver up to January and to that time have closed their order books.

The strike at the Steel mill is probably drawing to a close. It involved no principle, and had no basis of right on which to stand. It was arbitrary, coercive in character and aggressive without justification. The management of the mill openly declare they will manage their business according to their own ideas and they will not make concessions to unjust demands. From primal sources your correspondent is informed that operations at the mill will be increased this week and the ground lost by enforced shutting down of furnaces will be regained by their resumption of business. This means that the vacancies occasioned in the ranks of labor on account of the strike have been filled. It is current rumor that the sympathetic strike at the Bessemer rolling mills has about petered out, and affairs there during the week will resume their normal condition. One of the high officials of the order, whose advice "goes" and whose mandates have the stamp of recognized authority, is here to look into affairs and to assist in a satisfactory settlement of the differences between the contending interests. Things would be less muddled if the fingers in the mess were fewer.

The Steel plant at the rolling mill is temporarily closed owing to the breakage of the Plate mill. When it is in condition to work up the Steel as made the mill will again deliver its supply of material.

Mention was made of shipment of machinery to Brazil by the firm of Hardie-Tynes Company. Your correspond-

ent was again invited to witness the loading on cars of a duplicate shipment to Monterey, Mexico. Correspondence about machinery is on a constant increase with that country and this district is continuously adding to its already secured trade there.

The Dimmick Pipe Works are now running along as if they were old in the business. They are now turning out a handsome order for 24-inch Pipe for the Pacific Slope. In Foundry work they are going full tilt. The Birmingham Railway & Electric Company have about completed their extension to Owenton, and are now asking for necessary estimates for the transposition of the dummy line to Bessemer into a trolley system. When this is made the last remnant of the old systems of things will have disappeared. We now have over 100 miles of electric railway tracks and projects for additions are constantly suggesting themselves. The suburbs of Ensley City, Woodlawn and Avondale have granted charters and made contracts for water supply. This is the first step to the successful consolidation of interests which singly are wide apart into one harmonious whole, and into Greater Birmingham.

Pittsburgh.

Office of *The Iron Age*, Hamilton Building,
Pittsburgh, October 31, 1900.

(By Telegraph.)

Pig Iron.—The tone of the Pig Iron market is stronger and some Iron has sold at slightly higher prices. There have probably been 6000 to 8000 tons of Standard Bessemer sold at prices ranging from \$13.15 to \$13.25, Pittsburgh. Forge and Foundry Iron are reported to be stronger and sales of both have been made at prices a little higher than were obtained a week or ten days ago. We quote Bessemer Iron at \$13.15 to \$13.25; Gray Forge, \$12.75, and No. 2 Foundry at \$13.75 to \$14, all f.o.b. Pittsburgh. We note sales of 1000 tons of Standard Bessemer Iron at \$12.25, Valley furnace, and also 500 to 600 tons at \$13.15 to \$13.25, Pittsburgh; 1000 tons of Gray Forge at \$12, at Valley furnace, another of 500 tons at \$12.75, Pittsburgh; also a sale of 50 tons of No. 2 Foundry at \$13.75, Pittsburgh.

Billets.—Another meeting of the Billet mills is being held in the Holland House, New York, to-day (Wednesday), and efforts will be made to put the price of Billets at about \$20, Pittsburgh. At the meeting held Thursday, October 25, nothing was done, for the reason that two of the leading mills were not present. In the meantime the Steel market seems to be stronger, and we are advised a leading mill has made sales of Bessemer and Basic Open Hearth Billets, Soft Carbons, at \$18 to \$18.50, Pittsburgh. There is more inquiry for Steel, probably due to the fact that buyers are trying to cover in anticipation of an advance. We can report a sale of 1000 tons of Billets at about \$18, Pittsburgh.

Sheet Bars.—We continue to quote Sheet Bars, long lengths, at \$20, delivered, Pittsburgh. Light-Sheet and Tin Bars, running about 7 lbs. to the lineal foot, are quoted at about \$22, Pittsburgh.

Muck Bars.—The market is quiet and we quote standard grade at \$24.50, Pittsburgh.

(By Mail.)

The actual situation as it exists in the Rail trade is fully set forth elsewhere in this report. The Pennsylvania order for 144,000 tons has been divided between six mills, the only mill not participating being Colorado. We can report a very firm market on Pig Iron, with slightly higher prices being quoted. Steel is also strong, the absolute minimum of the market being \$17, with some sellers quoting up to \$17.50 to \$18. The volume of business in Finished Material is large, and some heavy contracts for Plates, Structural Material and Sheets have recently been placed. The action of the Plate mills in putting Plates at 1.25c. took the trade by surprise. So far as we know the price is being rigidly held.

Structural Material.—A great deal of foreign business is pending, much of it for South Africa, but has not yet been closed. An Eastern job, requiring about 5000 tons of material, has been placed with a local mill. There is a good general demand for Shapes and the Beam mills are running full, with plenty of orders ahead. We quote: Beams and Channels, up to 15-inch, 1.50c.; over 15-inch, 1.60c.; Angles, 3 to 6 inches, inclusive,

1.40c.; over 6 inches, 1.50c.; under 3 inches, 1.25c.; Zees, 1.50c.; Tees, 1.55c.; Bars, 1.10c. to 1.15c.; Universal and Sheared Plates, 1.25c., all f.o.b. Pittsburgh.

Rails.—Sensational statements have recently been made in the daily press to the effect that the reported order of 150,000 tons of Rails placed by the Pennsylvania Railroad with several of the leading Rail mills had not been placed at all. We can state authoritatively that this road placed an order last week for 144,000 tons of Rails, and at the fixed price of \$26 a ton at works, without rebates of any kind. In regard to the claims made that the railroads were very much dissatisfied with the high price of \$26 on Rails, we can also state authoritatively that this price was fixed by the railroad presidents themselves and is entirely satisfactory to them. It should be borne in mind that when the railroads are willing to pay a good price for their Rails it indicates that they are prosperous, and also enables them to obtain much higher prices for old material which they may take up and for other Scrap which accumulates along their lines. There has been much printed in regard to the Rail situation that is absolutely untrue and without foundation. The railroads are preparing to place additional contracts for Rails, and indications are that tonnage for 1901 will considerably exceed 2,000,000 tons. The Edgar Thomson plant has orders ahead for some months and is being operated to its utmost capacity, turning out from 2200 to 2500 tons of Rails every day in two turns of 12 hours each. We quote standard Steam Rails at \$26 a ton, at mill.

Plates.—At a meeting of the leading Plate mills East and West, held in New York on Thursday, October 25, a temporary agreement on prices of Plates was made, fixing the price of Sheared Plates, Tank quality, ¼-inch and heavier, at 1.25c.; Shell, 1.30c.; Flange, 1.35c.; Marine, 1.45c., all f.o.b. Pittsburgh. This price is to be observed by the Eastern mills, who will base their quotations in the future at 1.25c., Pittsburgh, adding freight to destination. In view of present costs of Pig Iron and Steel, it is claimed that 1.25c. on Plates is a conservative price. We can state that some large orders for Plates have been offered in the past week or ten days. The leading local mill took contracts about a week ago for fully 10,000 tons of Plates for lake boats, and also captured considerable other tonnage. Large orders for Basic Sheared Plates have been placed and the leading Plate mills are pretty well filled up for the next two or three months. The market on Plates is represented by the quotation given above.

Ferromanganese.—We continue to quote 80 per cent. Ferromanganese at \$75 a ton, in 50-ton lots or over. In carload lots and less we are advised that \$85 is quoted. Both quotations are delivered at buyer's mill.

Bars.—There is a good deal of tonnage being placed in Steel Bars, the trade evidently being apprehensive to some extent of higher prices, and are placing orders more liberally. Several of the leading mills are holding Steel Bars at 1.15c. minimum, but on desirable specifications and round tonnage 1.10c. can be done. We note a good demand for Common Iron Bars and we quote at 1.20c. to 1.25c. in carload lots, at mill. High grade Iron Bars made by local mills from selected stock are quoted from 1.50c. to 1.60c. In exceptional cases and for attractive tonnage the lower price is shaded.

Sheets.—We note a particularly heavy demand for Galvanized Sheets and some of the mills are considerably behind in deliveries. There is also an active trade in Black Sheets and the market is firm. Some contracts for Black Sheets have been made at present prices for extended shipment. We quote No. 27 Black Sheets, box annealed, at 2.80c. to 2.85c.; No. 28, 2.90c. to 2.95c., carload lots. We quote Galvanized Sheets at 75 per cent. off, 15c. freight, in carload lots.

Merchant Steel.—On several kinds of Merchant Steel prices have been advanced. There is a good demand and the market is firm. We quote: Tire Steel, 1.25c. in carload lots, 1.30c. to 1.35c. in small lots; Toe Calk, 1.50c. in large lots and 1.60c. in small lots; Open Hearth Machinery, 2c. to 2.10c.; Plow Slabs, 1.65c. to 1.75c., base; Open Hearth Spring, 2c. to 2.10c.; Hammered Lay Steel, 3c.; Rolled Lay Steel, 2.50c.; Cold Rolled Shafting, 60 and 10 per cent. off in carloads; Tool Steel, 7c. and upward, according to quality. On Tool Steel freight is allowed east of the Mississippi River. Terms are 60 days, 2 per cent. off for cash in 10 days.

Skelp.—Some of the Skelp Mills are quoting higher prices than they would have accepted two weeks ago. There is a good demand for both Iron and Steel Skelp, and the market is firm. We quote Grooved Iron Skelp at 1.45c. to 1.47½c. and Sheared at 1.50c. to 1.60c. Steel Skelp, Grooved and Sheared, is quoted at 1.30c. to 1.35c., delivered. We note a sale of 500 tons of Grooved Iron Skelp at 1.45c., Pittsburgh.

Pipes and Tubes.—Some of the small Pipe mills are not promising deliveries on Galvanized Pipe inside of six weeks. On certain sizes of Black Pipe deliveries are hard to get. There is an active demand and the market is firm. The unevenness in prices existing some time ago has, we are advised, entirely disappeared. Consumers in carload lots are quoted as follows:

Merchant Pipe.		
	Black. Per cent.	Galvd. Per cent.
1/4 to 1/2 inch and 11 to 12 inch.....	61	48
3/4 to 10 inch.....	68 1/2	56

Casing, Random Lengths.		
	S. & S.	I. J.
2 to 3 inch.....	58	53 1/2
3 1/4 to 4 inch.....	63	59
4 1/2 to 12 1/2 inch.....	65	61 1/2

Casing, Cut Lengths.		
	S. & S.	I. J.
2 to 3 inch.....	53 1/2	49
3 1/4 to 4 inch.....	59	55
4 1/2 to 12 1/2 inch.....	61 1/2	57 1/2

Boiler Tubes.		
	Up to 22 feet. Per cent.	22 feet and over. Per cent.
Steel.		
1 inch to 1 1/2 inch and 2 1/2 inch.....	49 1/2	44 1/2
1 1/2 to 2 1/4 inch.....	45	39 1/2
2 1/4 to 13 inch.....	57	52 1/2
Iron.		
1 inch to 1 1/2 inch and 2 1/2 inch.....	49 1/2	44 1/2
1 1/2 to 2 1/4 inch.....	45	39 1/2
2 1/4 to 13 inch.....	57	52 1/2

Prices to jobbers are about 5 per cent. less than the above.

Connellsville Coke.—We are advised that there is a better demand for Coke and the outlook is that there will be still further improvement in this direction after the election. Last week, out of 20,762 ovens in the Connellsville region, 14,222 were active and 6530 idle, the output having been 14,248 tons, a slight gain over the previous week. The leading Coke interests continue to quote strictly Connellsville Furnace Coke at \$2 a ton; 72-hour Foundry at \$2.25 to \$2.50 a ton, at oven. Smaller operators, however, are shading these prices. We may also note that much lower quotations are being made on Main Line Coke, which is made outside the Connellsville region.

President Norton of the Clover Leaf Railroad has placed an order with the National Steel Company, at Youngstown, for 3900 tons of Steam Rail, 70 lbs. to the yard. This road expects to place another contract for 5000 tons in a short time.

St. Louis. (By Telegraph.)

Office of The Iron Age, 1205 Chemical Building, {
St. Louis, October 31, 1900. }

Pig Iron.—An effort is being made to restore the price of Southern Iron to a basis of \$10, Birmingham, for No. 2, after the reported softening of last week. There is reliable advice that No. 2 sold at close to \$9.50, at furnace, but it would seem from information gathered to-day that the low price may have been withdrawn. A fair amount of moderate sized orders were received this week and in nearly every case the buyer wants quick action. Being the closing week of the Presidential campaign, there is very little on foot involving future delivery. Large consignments are now awaiting the result at the polls before taking definite action. We quote, f.o.b. cars St. Louis:

Southern, No. 1 Foundry.....	\$14.00 to \$14.50
Southern, No. 2 Foundry.....	13.00 to 13.50
Southern, No. 3 Foundry.....	12.50 to 13.00
No. 1 Soft.....	14.00 to 14.50
No. 2 Soft.....	13.00 to 13.50
Gray Forge.....	11.75 to 12.25

Bars.—Jobbers report a reasonably good demand for Bars, but mills say they are not getting much new business this week, owing to the proximity to November 6. The sale of Hoops is said to be unusually heavy. There is every indication that, the election results being favorable to the business interests of the country, active buying will take place all along the line. It is reported that mill prices on Plates have been advanced from \$3 to \$5 per ton. Mill prices on Steel and Iron Bars have reached the same level in some instances, and quotation on both is now 1.40c. to 1.45c., base, half extras, for large orders. Jobbers quote carloads from mill at 1.65c., full extras, for Steel; smaller lots of Steel and Iron range from 1.75c. to 1.90c., full extras.

Rails and Track Supplies.—The regular run of business is in force this week. Weather conditions are extremely favorable for track work and full advantage of it is being taken by lines in this territory. We quote Splice Bars, 1.35c. to 1.75c.; Bolts, with Square Nuts, 2c. to 2.10c.; with Hexagon Nuts, 2.10c. to 2.20c.; Spikes, 1.70c. to 1.80c.

Pig Lead.—There is a rumor that the American Smelting & Refining Company have been quietly cutting prices on Desilverized and at the expense of local producers. Heavy consumers in this district when questioned gave no credit to the report. There is, however, greater difference between Chemical at 4.25c. and Desilverized at 4.32 1/2c. than ordinarily obtains. Common brands are quoted as low as 4.22 1/2c. Lead Ore is firm at \$46.

Spelter.—There is but little activity in this metal. The market lacks inquiries and at the same time there is said to be practically no reserve stock in smelters' hands. Prices are unchanged at 4c. to 4.02 1/2c. The top price for Zinc Ore was \$28.50.

The British Iron Market.

Summary.—Business has continued quiet throughout the Iron and Steel trades during the past week. Prices have an easier tendency, although very few quotable changes have taken place. Pig Iron has been in slow sale, purchasers pursuing a waiting policy. The demand for Finished Material is not so heavy as is usual at this time of the year, but in some districts manufacturers have sufficient orders on hand to keep them busy for a time. The engineering trades are still quiet, except in some special departments, where activity is maintained. American advices are unfavorable and reports to hand from the continent are not encouraging.

Pig Iron.—The Pig Iron markets have shown little animation during the past week and have had a weaker tendency. In the Cleveland district, however, makers are in no hurry to put prices of the higher qualities down, the old contracts in hand being sufficient to absorb most of the production. No. 3 has been kept at the same figure as ruled last week, 68 shillings, which is only 3 shillings below the topmost price of the year, but closes at 67 shillings 9 pence. The lower qualities have also gone down slightly. In the Glasgow warrant market there has not been much doing, although business has improved of late, and Scotch stand at 66 shillings 3 pence, as against 65 shillings 9 1/2 pence last week. Hematite Pig has been easier in both Middlesbrough and Barrow. The following is a statement of the public stocks in tons:

	Tons.	Decrease during 1900. Tons.
Connell's at Glasgow.....	81,432	163,000
Connell's at Middlesbrough.....	12,500	
Railway Stores, Middlesbrough.....	5,070	52,700
Connell's at Middlesbrough, hematite.....	555	8,948
Hematite, West Coast.....	41,459	126,388

Manufactured Iron and Steel.—Although business in Manufactured Iron and Steel is not so brisk as it has been during the earlier months of the year and trade in some districts drags on slowly, the general condition of affairs is no worse and the mills and forges are for the most part kept going on the execution of contracts for prompt delivery. In South Staffordshire the Finished Iron business arising out of quarter day negotiations is fairly satisfactory; the marked Bar houses adhere steadily to £11 10s. as the basis price, while in Common Iron bookings are done at £9 10s. to £9 15s. In the Steel trade there is some activity in Barrow and Staffordshire, but in Lancashire business is dull and prices are very irregular.

Engineering and Shipbuilding.—The position throughout the general engineering trades continues without much change, establishments for the most part being fairly well engaged upon orders in hand, but very little new work coming forward. In one or two special branches, however, activity is being fully maintained. There is a large amount of work giving out in the locomotive building trade, which affords every prospect of exceptional pressure well over next year. The electrical engineering trades are also in pretty much the same position, with a heavy weight of work still coming forward and in prospect for a considerable time ahead. In the shipbuilding industry the orders placed during the week are few in number, but hopes are entertained that a goodly number of the expected Government contracts will find their way into private yards.

Comparison of Prices.—The annexed table shows the current prices compared with those of last week, and of the corresponding period last year:

	Oct. 18, 1900.	Oct. 11, 1900.	Oct. 19, 1899.
	s. d.	s. d.	s. d.
Iron Ore—			
Rubio, Middlesbrough.....	21 3	21 3	18 6
Rubio, Cardiff.....	19 6	20 6	16 9
Pottery Mine, North Staffordshire.....	20 6	20 6	17 6
Hematite, West Coast (at mines)....	19 6	19 6	16 6
Pig Iron—			
No. 3 Foundry, Middlesbrough.....	67 9	64 0	69 3
Warrants.....	67 6	67 9	69 1
Scotch Warrants, Glasgow.....	66 3	65 9 1/2	70 1 1/2
Hematite Warrants, West Coast.....	76 3	75 3	74 8
Cold Blast (Foundry), South Staffordshire.....	130 0	130 0	117 6
Welsh Hematite, Cardiff.....	80 0	80 0	82 6

Manufactured Iron and Steel—	£	s.	d.	£	s.	d.	£	s.	d.
Marked Bars, South Staffordshire	11	10	0	11	10	0	10	0	0
Common Bars	9	15	0	9	15	0	9	0	0
Steel Rails, Middlesbrough	7	2	6	7	2	6	6	15	0
Steel Rails, West Coast	7	5	0	7	5	0	6	10	0
Steel Rails, Cardiff	7	0	0	7	0	0	6	15	0
Steel Angles (eng.), Middlesbrough	8	7	6	8	7	6	7	15	0
Steel Angles (eng.), Glasgow	8	0	0	8	0	0	7	7	6
Steel Plates (ship), Middlesbrough	8	0	0	8	0	0	7	15	0
Steel Plates (ship), Glasgow	8	0	0	8	0	0	7	15	0
Tin Plates, Bessemer IC Cokes, South Wales	s.	d.		s.	d.		s.	d.	
	14	0		14	0		15	6	

—Iron and Coal Trades Review, October 19, 1900.

New York.

Office of *The Iron Age*, 232-238 William street, {
NEW YORK, October 31, 1900. }

Pig Iron.—The market has been very active, and a considerable number of large lots have been taken. One large Connecticut foundry has bought largely, and a leading pump interest has only partly covered its inquiry for about 10,000 tons. A good many of the sales, however, have been made at close prices. Quotations are as follows at tidewater: Lehigh, Schuylkill and Virginia Irons, No. 1, \$16.50 to \$18; No. 2 X, \$15 to \$16; No. 2 Plain, \$14 to \$15; Gray Forge, \$13.75 to \$15. Tennessee and Alabama brands, No. 1 Foundry, \$15 to \$15.50; No. 2 Foundry, \$14 to \$14.50; No. 1 Soft, \$15.25 to \$15.50; No. 2 Soft, \$14 to \$14.50; No. 3 Foundry, \$13.50 to \$14; No. 4 Foundry, \$13 to \$13.50; Gray Forge, \$12.75 to \$13.25.

Cast Iron Pipe.—No transactions of any consequence have taken place. It is probable that there will be many bids on the 30,000 tons to be let to-morrow in this city. We continue to quote \$23 to \$23.50 for 8-inch per gross ton, at tidewater.

Steel Rails.—The Eastern mills received their share of the 144,000 tons given out by the Pennsylvania Railroad. We do not hear of any new export business. The report that the English makers have reduced their prices to £6 10s. is not regarded as of much significance here. We quote \$26 for Standard Sections, \$25 and \$26 for Light Sections, and \$38 to \$38.50 for Girder Rails. We quote Spikes, 1.45c. to 1.50c.; Splice Bars, 1.25c. to 1.35c.; Square Track Bolts, 2.05c. to 2.15c., and Hexagon Bolts, 2.20c. to 2.25c.

Finished Iron and Steel.—The contract for the Lloyd pier at Hoboken, to which we alluded last week, proves to be somewhat larger than stated, the quantity involved being about 7800 tons, the material being divided between two concerns. The market continues quite active, and in the case of Plates there has been a general advance by agreement. We quote as follows at tidewater: Beams, Channels and Zees, 1.65c. to 1.70c.; Angles, 1.30c. to 1.40c.; Tees, 1.65c. to 1.75c.; Bulb Angles and Deck Beams, 1.90c. to 2c.; Universal Mill Plates, 1.25c. to 1.30c.; Sheared Steel Plates are 1.35c. to 1.40c. for Tank, 1.50c. to 1.60c. for Shell, 1.60c. to 1.75c. for Flange, 2.25c. to 2.30c. for Fire Box, 3.50c. to 4c. for Locomotive Fire Box, on dock. Charcoal Iron Plates are held at 2.25c. for C. H. No. 1, 2.75c. for Flange, and 3.25c. for Fire Box. Refined Bars are 1.30c. to 1.35c.; Common Bars, 1.15c. to 1.25c.; Soft Steel Bars, 1.15c. to 1.30c., and Hoops, 1.90c. to 2.25c., base, on dock.

Crocker Bros., 99 John street, sole agents for Virginia Iron, Coal & Coke Company and other companies, have secured the services of J. M. Payne, who will represent them in Pennsylvania, Delaware, Maryland and Virginia, traveling from Philadelphia.

Metal Market.

Office of *The Iron Age*, 232-238 William street, {
NEW YORK, October 31, 1900. }

Pig Tin.—After slight fluctuations the market settled back to a figure which is a little in advance of that quoted last week. At the close to-day spot was quoted 27.82½c. to 27.87½c. November was quoted 27.85c. to 27.90c. Business was very light, buyers coming in only for small lots. The London market closed at a slight advance over last week with £127 5s. for spot and £124 for futures. Arrivals here during the month of October amounted to 2237 tons and deliveries aggregated 2200 tons, leaving a stock about the same as that which was on hand October 1. The stock, including spot and landing, now is 3097 tons.

Copper.—There is practically no change in the market. Business is dull, but the producers are still upholding the price. Lake Superior Ingot is quoted to-day 16¾c., while Casting Stock and Electrolytic are quoted 16¾c. There is a report going the rounds to the effect

that a sale of several million pounds of Electrolytic Copper had been made, deliveries extending up to March of next year. While ordinarily this would not be looked upon as an especial transaction, under the present conditions it is thought to be significant. The London market has not changed much, closing prices to-day being £72 for spot and £72 12s. 6d. for three months' futures. Best Selected has advanced 5 shillings and is quoted to-day £78 10s.

Pig Lead.—There is no change in the market, the American Smelting & Refining Company still holding to their figure, 4.37½c., for lots of 50 tons and more, New York delivery, and 4.32½c., St. Louis. The talk of the American Smelting & Refining Company absorbing the Guggenheim interests has broken out afresh. It is now stated that the deal awaits only upon the result of the election. It is said that the papers are drawn, and that if the political contest results favorably the transaction will be closed. At the offices of the American Smelting & Refining Company it was said that no official information was to be had at this time. One of the directors of the company, however, stated that the matter had not as yet been brought before the board, and that surely the affair cannot have reached the stage reported. He also said that it was not probable that the transaction could be consummated immediately, as it would be necessary after the directors had decided upon the matter to hold a meeting of the stockholders in order to increase the capital of the company. The London market has advanced a shade, being quoted to-day £17 12s. 6d.

Spelter.—Buyers are still coming in only for small lots, but it is stated that there has been a little extra activity during the week under review. Prices are unchanged, ordinary brands being quoted 4.10c. to 4.15c., and special prime Western brands, 4.25c. to 4.35c. The London market has declined to £18 15s., which is the lowest price reached this year, and closed to-day £18 16s. 3d.

On December 29 a meeting of the stockholders of the Edgar Zinc Company will be held at St. Louis to vote on an increase of the capital stock, which will increase it from \$500,000 to \$1,000,000. The company intend doubling their producing capacity.

Antimony.—Is unchanged, Hallett's being quoted 9½c., and Cookson's 10½c.

Nickel.—There is no change; the metal is still scarce and a fair demand continues. Prices of small lots range between 55c. and 60c.

Quicksilver.—Is unchanged, prices here being \$51 per flask of 76 lbs. in lots of 50 flasks or more. The London quotation is £9 2s. 6d.

Tin Plate.—A fair business is reported from jobbers. The American Tin Plate Company are still quoting on a basis of \$4.19 per box, Standard 100-lb Cokes, New York delivery, and \$4, f.o.b. mills.

OBITUARY.

FRANK WILLIAMS.

Frank Williams, well known in the iron and steel industry, died on October 16 at his home in Johnstown, Pa., after a lingering illness, aged 35 years. He was born and educated in Johnstown and at an early age entered the laboratory of the Cambria Iron Company, where he remained two years, subsequently taking a course in metallurgy at Lehigh University. After leaving Lehigh Mr. Williams entered the employ of the Edgar Thomson Steel Company and later that of the Michigan Steel Company at Detroit. Subsequently he went to Europe to study the basic method of steel manufacture. Upon his return to this country he went to Chicago and assumed charge of the East Chicago Foundry. Later he took charge of the Fayette Mfg. Company at Layton, Pa., of which he became president and general manager. He organized the Basic Brick Company and managed that concern as well as the Layton plant until his health broke down some time ago.

The Riter-Conley Mfg. Company of Pittsburgh, builders of iron and steel structural work, have been invited to bid on a portion of the bridges to be erected in South Africa. It is expected that a very large amount of this work will come to this country, and that much of it will be secured by the American Bridge Company. The Riter-Conley Mfg. Company are completing the construction of an immense steel feed pipe line for the Albany & Hudson Railway & Power Company at Stuyvesant, N. J.

QUOTATIONS OF IRON STOCKS DURING THE WEEK ENDING OCTOBER 31, 1900.

Cap'l Issued.		Thursday.	Friday.	Saturday.	Monday.	Tuesday.	Wednesday.	Sales.
\$29,000,000	Am. Car & Foundry, Common.....	18 -18½	17½-18½	18 -18½	17½-18½	16½-17½	17½-17½	17,105
29,000,000	Am. Car & Fndry, Pref. (7 % NonCu.)	-64	63½-64½	64½-64½	63½-64½	63½-64	64½-64½	4,296
19,000,000	Am. Steel Hoop, Common.....	23½-24½	23½-24½	22½-24½	21½-22½	22½-22½	22½-23	11,695
14,000,000	Am. Steel Hoop, Pref. (7% Cu.).....	72½-75½	74 -75½	74½-75½	74½-75	.....	-74½	7,445
50,000,000	Am. S. & W., Common.....	35½-36½	34½-36	34½-36	34½-34½	34 -35½	34½-35½	34,035
40,000,000	Am. S. & W., Pref. (7 % Cu.).....	74½-75½	74½-75	75 -75½	74½-75	74 -75½	75½-76	12,440
28,000,000	Am. Tin Plate, Common, N. Y.....	34½-35	34½-35½	35 -35½	34 -34½	32½-33½	32½-33	16,390
18,325,000	Am. Tin Plate, Pref., N. Y. (7 % Cu.)..	-82½	-82	-82	-82½	-82½	-82½	1,591
7,500,000	Bethlehem Iron.....	-56½	-56½	-56½	-56½	.....	.....	216
15,000,000	Bethlehem Steel, Par \$50, \$1 paid in..	-15½	15½-16	.....	15 -15½	-15½	-15½	515
7,974,550	Cambria Iron, Phila*.....	-45	.....	.....	.....	.....	.....	700
16,000,000	Cambria Steel**.....	16 -16½	15½-16½	-15½	15½-15½	15½-16	15½-15½	2,505
11,000,000	Col. Fuel & Iron.....	39½-40½	38½-40	39½-40	38½-39	38½-39	37½-39½	9,965
46,484,300	Federal Steel, Common.....	39 -40½	38 -39½	38½-39½	37½-38½	37½-39	37½-39	44,085
53,253,500	Federal Steel, Pref. (6 % Non-Cu.)....	68½-69½	68½-69½	.....	67½-68½	67½-68½	.....	7,454
32,000,000	National Steel, Common, N. Y.....	30 -30½	29½-30½	30 -30½	28½-30	28½-29	28½-29	7,695
27,000,000	Nat'l Steel, Pref., N. Y. (7 % Cu.)....	87½-87½	88 -88½	.....	87½-88	87½-88	-87½	2,413
40,000,000	National Tube, Common, N. Y.....	55 -55½	54½-55½	55 -55½	53½-55½	53 -53½	53½-53½	15,410
40,000,000	Nat'l Tube, Pref., N. Y. (7 % Cu.)....	98½-98½	98 -98½	98½-98½	97½-98½	97½-97½	98 -98½	4,964
5,000,000	Penna., Common, Philadelphia.....	-55	.....	.....	-55	-55	-54	162
1,500,000	Penna., Pref., Philadelphia.....	.....	90 -92½	.....	.....	.....	.....	80
12,500,000	Pressed Steel, Common.....	43½-43½	42½-43½	43 -43½	42½-43	42½-43	43 -43½	7,548
12,500,000	Pressed Steel, Pref. (7 % Non-Cu.)....	-81½	.....	.....	-80½	.....	-80½	530
27,191,000	Republic Iron and Steel, Common.....	13½-14½	13½-14	13½-14	13½-13½	13½-13½	-13½	6,497
20,306,900	Repub. Iron & Steel, Pref. (7 % Cu.)..	56½-57½	57 -57½	-57½	-56½	56½-56½	56½-57	2,872
7,500,000	Sloss-Sheffield S. & I., Common.....	.....	.....	.....	.....	.....	.....	.....
6,700,000	Sloss-Sheffield S. & I., Pref. (7 % Non-Cu.) .....	.....	.....	.....	.....	.....	.....	.....
20,000,000	Tennessee Coal & Iron.....	58½-60½	58½-60	58 -59½	54 -57½	55½-56½	54½-57	33,635
1,500,000	Warwick Iron & Steel (par \$10).....	.....	- 8	.....	- 7½	.....	.....	325

* Par \$50. ** \$9 per share paid in. † 6% guaranteed by Beth. Steel Co. Late Philadelphia sales by telegraph. ‡ Ex-dividend.

Bonded Indebtedness: Am. S. & W., \$130,656; Am. Tin Plate, none; Am. Steel Hoop, none; Cambria Iron Co., \$2,000,000 6% debenture 20-year bonds, 1917, payable option 5 years, assumed by Cambria Steel Co.; Federal Steel Co., \$9,822,000 Illinois 5%, \$7,417,000 E. J. E. R. R. 5%, \$1,600,000 Johnson 6%, \$6,732,000 D. & L. R. R. 5%, \$1,000,000 2d D. & L. R. R. 6%, \$10,000 land grant D. & L. R. R. 5%; National Steel, \$2,561,000 6%; National Tube, none; Tennessee C. I. & R. R. Co., \$8,367,000 6%, \$1,114,000 7%, \$1,000,000 7% cu. pref.; Pennsylvania Steel, \$1,000,000 5%, Steelton, 1st, 1917 \$2,000,000 5%; Sparrow's Point, 1st, 1922, \$4,000,000, consolidated, both plants; Bethlehem Iron, \$1,351,000 5% maturing 1907. Interest and principal guaranteed by Bethlehem Steel Co. Republic Iron & Steel, none; Warwick Iron & Steel, none; Colorado Fuel & Iron Co.; Col. Fuel Co. Gen. Mort. 6% \$880,000, Col. Coal & Iron Con. Mort. 6% \$2,810,000, Col. Fuel & Iron Gen. Mort. 5% \$2,303,000. Also outstanding \$2,000,000 preferred stock with accumulated dividends of \$640,000 to June 30, 1899. Sloss-Sheffield St. & I. Co., Sloss I. & S. first mortgage 6%, \$2,000,000, Sloss I. & S. general mortgage 4½% \$1,835,000.

Iron and Industrial Stocks.

There has been a fairly steady market during the last week. A slight sagging of values followed the boom of a week ago, but on the whole values were kept pretty steady. Sales have been rather slight. On Monday last there was a decline of more than four points scored in Tennessee Coal & Iron. After a rally of slightly more than a point on Tuesday the market closed to-day in this stock half a point above the low price of Monday. American Steel Hoop preferred netted an advance of two points on the week under review.

	Bid.	Asked.
American Bicycle Company, common.....	4½	6
American Bicycle Company, preferred.....	21	24
American Bicycle Company, bonds.....	60	70
E. W. Bliss, common.....	.....	137½
E. W. Bliss, preferred.....	125	.....
Cramp's Shipyard stock.....	68	72
Diamond State Steel.....	4	4½
Empire Iron & Steel, common.....	4	10
Empire Iron & Steel, preferred.....	38	43
International Silver, common.....	4	4½
International Pump, common.....	21	22½
International Pump, preferred.....	69½	70½
National Enam. & St., common.....	19	24
National Enam. & St., preferred.....	74	80
New Haven.....	4	4½
Otis Elevator, common.....	26½	27
Otis Elevator, preferred.....	86	87
Pratt & Whitney, common.....	3½	5
Pratt & Whitney, preferred.....	45	55
Tidewater Steel.....	8	8½
U. S. Cast Iron Pipe Company, common.....	4	4½
U. S. Cast Iron Pipe Company, preferred.....	31	34
U. S. Projectile.....	100	.....
Va. C. I. & C., stock.....	5	8
Va. C. I. & C., bonds.....	33	37
H. R. Worthington, preferred.....	.....	110

The National Tube Company report net earnings for August and September as \$1,900,000. This is the best showing for any two months yet made by this interest.

Dividends.—The Bethlehem Steel Company has declared a dividend of 50 cents per share, payable on December 1, to stock of record November 5.

The Pressed Steel Car Company of Pittsburgh are receiving orders for a new style of steel ballast car designed recently. The Lake Shore has ordered 100 of these ballast cars, with a capacity of 100,000 pounds each, and the New York Central has ordered 25 cars of the same capacity, to be delivered in September. The 600 hopper cars ordered by the Chesapeake & Ohio will be 28 feet long and of 100,000 pounds capacity. The Erie Railroad has just given an order for 1000 new steel cars of the largest type, to be used in their coal and ore traffic.

Trade Publications.

Pumping Machinery.—The general catalogue of George E. Dow Pumping Engine Company, San Francisco, Cal., describes their steam, electric and power pumps and hydraulic machinery. Their underwriter pump is designed and built according to specifications adopted by the Associated Factory Mutual Fire Insurance Companies. Its steam ports and water passages and air chamber are made much larger than in the ordinary trade fire pump, so that a larger volume of water can be delivered in an emergency without water hammer. It is "rust proofed," that it may start instantly after long disuse, by making its piston rods and valve rods of Tobin bronze instead of steel and its plungers and stuffing boxes of brass instead of cast iron.

Rock Drills and Drilling Presses.—We have received from the John M. Rogers Boat, Gauge & Drill Works, Gloucester City, N. J., a catalogue of their rock drills and appliances connected therewith. In their Eureka drill the valve is of the Corliss or rotary design, and retains a perfectly steam or air tight seat under all conditions. The valve casing is constructed with two chambers, one in direct connection with the source of pressure supply and exhaust, and the other having passages leading to the cylinder. This arrangement of having the valve in one chamber and the piston in the other results in an always tight valve, no leaking, always positive, controlling the piston in the longest or shortest stroke and enabling the drill to run at any pressure without the difficulties usually arising from the presence of wet steam. The stuffing box is so designed that it automatically applies and releases its grip of the packing on the rod. In other words, the greater the pressure per square inch of the motive power the tighter will be the packing grip of the rod, and *vice versa*, while with no pressure there is little or no friction of the packing. A great saving is by this means obtained in packing, in the time required for making renewals, in the wear of the rod, and in the power applied, while the efficiency of the machine is very much increased. The drill has a variable stroke and strikes a very hard blow and the recovery is instantaneous. To sum up, this drill will start automatically at any part of the stroke, will run at any speed desired, whether the very fastest or the very slowest, without danger of stopping, and it is claimed can be run with less steam or air for a given amount of work than any other drill. All parts of these drills are made interchangeable.

The Chicago Machinery Market

Office of *The Iron Age*, 1205 Fisher Building, {
CHICAGO, October 27, 1900. }

The Chicago machinery market has been inclined to dullness during the greater part of the month. The influence of the approaching election is naturally credited with having caused decided conservatism on the part of buyers. The quietness is, of course, more pronounced in some lines than in others. Special causes also contribute to make certain branches of business extremely quiet from the standpoint of manufacturers of machinery.

The demand for machine tools became a little more active toward the close of the month. This is probably due to the fact that considerably more confidence is felt regarding the probabilities of the continuance of the present national administration. Nevertheless, although the desire to make improvements in shops and to enlarge facilities is reported to be strong with many users of machine tools, they will wait to see what the actual result of the election will be. The month has brought out a few good contracts for machinery. One of these was for the equipment of the Goodman Mfg. Company, who are arranging to build a new factory in Chicago for the production of coal mining machinery. This is one of the few exhibitions of confidence in the situation worthy of record. The company, it is true, are engaged in a field in which the competition is not so severe as in some others which might be specified.

The implement manufacturers were very large buyers of machine tools and other machinery last year and during the early part of the present year. They have for some time bought very little, and their absence from the market is felt to a considerable extent. They continued to expand their facilities for so long a time and so much more than had been expected that they had grown to be regarded as one of the important factors in the machinery trade. They may become so again when the agricultural outlook in the Northwest improves. The railroad interests in the vicinity of Chicago were also among the large buyers of machinery for a considerable period who have latterly not added much to their machine shop equipment. It is expected, however, that an improved business will be received from them, owing to the fact that they are now renewing their purchases of rolling stock. The scarcity of cars indicates a continued demand for rolling stock to be kept in good condition, which means more work for repair shops.

Machinists' supplies were in better demand during October than in September. The volume of business expanded considerably, yet it fell short of what it should be. The influence of the campaign has evidently been felt in this branch as well as in other lines.

The feeling is expressed very generally that a much heavier demand for machinery of all kinds will be experienced after election is over and the uncertainty disappears. Many new enterprises are in abeyance and many improvements to old establishments which have been projected are held up to await the settlement of political issues.

The New York Machinery Market.

Office of *The Iron Age*, 232-234 William street, {
NEW YORK, October 31, 1900. }

Conditions remain quite unchanged. A fairly steady business in small lots is reported and good inquiries continue to come in. Prices remain unchanged.

There are interesting bits of gossip floating about regarding new lines which will be taken up by prominent concerns in the machinery trade. If the reports are well founded they are of importance to the trade. Probably the most surprising of these rumors is that the Morse Twist Drill Company of New Bedford, Mass., intend building an extensive machine shop and are going to build machine tools. It is said that they propose to build a complete line of milling machines, and that the new departure will be in charge of Hugh MacGregor, who for a number of years has been well known in the trade through his connections with the Brown & Sharpe Mfg. Company of Providence, R. I.

Another prominent concern who have an international reputation for building a certain line are said to be closing negotiations for the building of universal and plain grinding machines.

A number of important changes have been made at the Henry R. Worthington end of the International Steam Pump Company. A. J. Cauldwell, who for 20 years was general manager of the Worthington Hydraulic works, resigned his position and is now in the employ of the Crane Company of Chicago. Edward Prince, the superintendent of the Worthington foundry, also resigned to go with the Crane Company. Other changes are mentioned in connection with the sales department.

Purchases of a considerable quantity of machinery are being made by the General Incandescent Arc Light Company of 572 First avenue, New York. The tools are to be shipped to Germany. S. Bergman, the founder of the company, is conducting the purchasing. A short time ago Mr. Bergman went abroad and established in Berlin the Bergman Electric Equipment Company. Whether the machinery which is now being secured is to be placed in the shop of the German equipment plant or not is not generally known. It is said that Mr. Bergman has disposed of his interest in the German plant and is now engaged in new operations.

The International Gas Engine Company of 65 Delavan street, Brooklyn, are buying a fair sized equipment of machine tools. This company are the outcome of the reorganization of the Russ Motor Company, who formerly occupied the Brooklyn plant. It is said that the capital of the reorganized company is considerably greater than was that of the old company. Part of the increase of capital is to be expended in the erection of a new plant.

Owing to the death of the late F. S. Perkins the plant of the Perkins Machine Tool Company of Lowell, Mass., is to be sold at auction to-morrow. It is said that the machinery is of large variety. The company were builders of lathes and other machine tools. The sale is made in order to carry out a provision in the will of the late Mr. Perkins.

Specifications have been issued by the Edison Electric Illuminating Company of New York for the entire equipment of pumping machinery which is to be installed in the new "Waterside" power station. The specifications for the piping of the great station are also ready. The Edison Electric Illuminating Company are now installing two large Cahall boilers in their Duane street station, as well as a Goubert feed water heater. Other additions will be made to the Duane street station.

Arrangements are being made for the purchase of the machinery required in the equipment of the new North German Lloyd piers at Hoboken, N. J.

The New York Vehicle & Transportation Company, who recently purchased the old Eighth avenue car stables at Forty-eighth street, New York, are purchasing machinery for the equipment of the new plant. A 10-ton electric traveling crane, with ten special hoists, has just been ordered from the Morgan Engineering Company of Alliance, Ohio.

Upward of \$40,000 will be spent by the Chihuahua & Pacific Railroad Company of Chihuahua, Mexico, in the equipment of their shops. The purchase will be made from the New York offices of the company, which are located at 80 Broadway.

It is reported in the street that the Singer Mfg. Company intend building an extensive shop system in the West. The rumor has it that \$600,000 will be expended on the plant, which is to be erected at South Bend, Ind.

There has been a little misapprehension regarding the recent sale of a portion of the plant of Rumsey & Co. of Seneca Falls, N. Y., to the International Fire Engine Company. We learn that only that portion of the Rumsey business which pertained to the manufacture of fire apparatus was sold to the International Company and that they will continue at Seneca Falls in the manufacture of pumps and all their other lines. The fire apparatus department will be moved to the plant which the International Company recently purchased from E. P. Gleason of New York.

Sherwan Tomes & Co. of 16 Beaver street have been purchasing an equipment for an electric plant which is to be built in China. The plant is to be at Kow-Loon, and it is said that \$60,000 worth of apparatus has been purchased already. Among the concerns who have received orders are the Heine Safety Boiler Company, Lawrence Machine Company, the Westinghouse Electric & Mfg. Company, Western Electric Company and Loebel & Andrews.

United States Consul Gibbs of Tamatave, Madagascar, has informed parties in the trade that Christian Bang, a merchant of that city, wishes the names of manufacturers of small hydraulic presses for baling fibers.

Bids for heating and ventilating apparatus and an electric lighting plant for School 122, Borough of Brooklyn, were received by the Board of Education, New York City, last week. Williams & Gerstle of Forty-fourth street and First avenue, were awarded the contract. Their bid was \$32,500. The other bids were as follows: The Baldwin Engineering Company, 107 West Seventeenth street, \$32,800; E. Rutzler, 178 Centre street, \$32,990; Walker & Chambers, 50 East Twentieth street, \$33,850; John Hankin & Brother, 115 East Thirteenth street, \$34,472; John Neal's Sons, 218 Centre street, \$35,000.

Specifications and proposal blanks are now ready for the machinery required in the construction and equipment of the large pumping plant which the Metropolitan Sewerage Commissioners are erecting at Boston, Mass.

Bids will be received until January 12, 1901. The work will include an engine house, boiler house, chimney and masonry foundations for the pumps, engines and boilers, and will furnish a fresh water supply for the boilers up to the interior of the boiler house. Four boilers, of the vertical water leg internally fired fire tube type, a fuel economizer, feed water heaters, a traveling crane in the engine room, piping and all necessary appliances, such as found in pumping stations of the best class. Bids are also to be received for two vertical inverted, triple expansion, three crank fly wheel pumping engines, with three single acting plungers under the cranks. Each pump and engine must be capable of raising 50,000,000 gallons of sewerage in 24 hours, 45 feet vertically above the level of the sewage in the suction sewer at the screen chamber. Plans, proposal blanks, &c., may be obtained at the office of James A. Bailey, Jr., Board of Metropolitan Sewerage Commissioners, Boston, Mass.

The Hyatt Roller Bearing Company of Harrison, N. J., and 133 Liberty street, New York, have received an order from the Brown & Sharpe Mfg. Company of Providence, R. I., for an entire roller bearing equipment for the jack shaft in the new building which is being added to their works.

Trade Publications.

Cold Saw Cutting Off Machines.—We have received from Frederick H. Gliem & Co. of Philadelphia a catalogue descriptive of the various types of cold saw cutting off machines built by them. Their No. 1 universal machine carries a saw plate 21 inches in diameter and has a capacity for I beams on the side table up to 12 inches, and for sections on top the table of 17 x 5 inches, and for rounds in the V up to 6 inches in diameter. The machine is provided with variable automatic feed controlled by friction plates and ranging from $\frac{1}{4}$ inch to 2 inches per minute, with automatic stop and quick movement to the saw carriage by power in either direction. If the machine is being used to cut off rounds in V and it becomes necessary to change the saw the head may be returned by power, a new saw placed, and the head run up again by power, thereby saving much time when a number of pieces are being cut off.

Lathes and Shapers.—Two catalogues have been received from the Hendey Machine Company of Torrington, Conn., describing their lathes and shapers, and the first clearly shows, among other features, the Norton screw cutting mechanism as applied to a regular screw cutting lathe. As most of our readers are aware, this consists of an ordinary train of change gears mounted in the form of a cone directly on the screw of the lathe and secured thereto by one key or spline, the whole being inclosed in a box, which at once forms the cover for the gears and the bearings at either end for the screw. In the lower part of this box is arranged a driving shaft with bearings parallel to the screw. This shaft has a spline the full length of the inner side of the box and has sliding upon it the driving gear, or, as it is more commonly termed, the stud gear. This gear bears the proper relation to all the gears in the cone to cut the regular list of threads from 6 to 20, its position relative to the gears in the cone being controlled by a handle. The inner end of this handle is forked with bearings on either side of the gear, and in an upper extension of the same fork are the bearings for an intermediate gear, which is drawn in or out of the various gears of the cone by means of the handle. An index plate on the front of the head stock has notches of sufficient depth to receive and guide the handle and gear in perfect line with the cone gear wanted. This device alone will only cut the 12 regular threads from 6 to 20, but as the lower shaft has the same rotation as the lathe spindle, by means of equal gears on the outer end of the shaft and the regular stud of the lathe, it will be seen that by changing the relation of these gears the list of threads which may be cut will be multiplied according to the ratio of the gears in use, the index having as many rows of figures as there are changes. The lathes described have but two changes, cutting from $1\frac{1}{2}$ threads per inch to 80 threads per inch, and have one extra gear to cut $11\frac{1}{2}$ threads per inch for steam pipe. In daily use there are no changes of gears required for the feeds, as the movements of the lever give all the changes required. The above company have been making shapers for nearly 30 years, and at the present time make 15, 20, 24 and 28 inch stroke machines. These machines are superior for the workmanship, stability in their construction, evenness in handling, and range of work they will do, and particularly for their admirable design.

Machine Tools.—A large bound volume of 704 pages has been issued by Manning, Maxwell & Moore of 85 Liberty street, New York, describing and illustrating the machine tools and attachments built and handled by them. The catalogue is divided into groups, all the different patterns of certain types of tools being arranged together. The first division considers lathes of all kinds, from the largest engine lathes to small and simple speed lathes. Next follow illustrations and descriptions of a wide line of planers, shapers and their attachments. Next come slotting machines and radial, upright and sensitive drills, both single and multiple spindles, in a great variety of patterns. Next follow drill grinders and plain and universal milling machines, together with a full list of milling cutters. Their automatic gear cutter for spur, bevel and face gears is made in two sizes. The largest size is for heavy work and will cut any size of gear up to 74 inches diameter by 14-inch face and from $\frac{1}{4}$ to 3 inches circular pitch. The smaller size cuts gears up to 62 inches in diameter and 12 inches face as coarse as 1.570 inches circular pitch. On this machine has been introduced the 2-inch cutter mandrel and, consequently, the large diameter cutter. The enormous driving power of the machine fully justifies the use of the large cutter. Its advantages are that it can either be fed into the blank much faster, or, if preferable to run at the same speed as the small cutter, will last much longer. The cutter spindle is held by long, rigid bearings on both sides of the cutter. The cutter carriage is long, heavy and rigid, and has a long bearing on the slide. The cutter is held directly in the center of the carriage, and as the feed screw terminates directly back of it there is no direct central thrust. The machine is so designed that the cutter carriage cannot possibly feed forward unless the divisions have been fully completed. The dividing mechanism is the most perfect feature of the machine. It is so arranged that it will constantly take up all play or wear which occurs in the change gears and other auxiliary movements. With this feature divisions are always correct. The worm wheel is made in sections to insure absolute accuracy. The worm and worm wheel can be disengaged for testing blank and are entirely incased. Next follow boring and turning mills, both horizontal and vertical, car wheel and cylinder boring machines, together with many special forms. Hydrostatic car wheel presses, power presses, shearing and punching machines, riveting machines and air compressors and pressure tanks follow. Considerable space is devoted to pipe threading machines and bolt and nut machinery. Heating forges and hardening furnaces, using coal, coke, oil and gas, are also illustrated. The last 200 pages of the book are devoted to drop and power hammers, cold saw cutting off machines, grinding machines, both plain and universal, buffing and polishing appliances, electric traveling cranes, pneumatic jib cranes and wood working machinery. Taken as a whole, the work covers about every modification of every type of machine and tool built.

Steam Hammers.—The Pittsburgh (Pa.) Shear Knife & Machine Company have prepared a pamphlet descriptive of their single and double frame steam hammers. All these hammers are fitted with adjustable guides, which take up the wear of the ram and prevent breaking of the piston rod. The valve gear, consisting of three movable parts, takes up its own lost motion by gravity. Not being connected with the ram, it does not get the effect of the concussion of the blow. The valve gear is arranged to take both top and bottom steam, so that it is possible to get a single or automatic blow, with a single lever, without adjustments of any kind. A spring is placed on top of the cylinder, which takes the shock of the piston in case of careless running or piston rod breaking. The rams and dies of the single hammer are set diagonally to the frame, so that a piece of any length can be welded the long way of the die.

Railway Motors.—The Westinghouse Electric & Mfg. Company of Pittsburgh have issued a catalogue describing their standard railway motors, which are designed to meet all the varied requirements of modern railway practice. Their No. 69 motor is of the latest design, and is fitted with removable laminated pole pieces, bolted to a cast steel yoke, the coils being held in place by the pole tips. The bolts which retain the poles do not pass through, but terminate in a long nut inside the pole piece; the latter, therefore, presents a smooth, unbroken surface, and the pole is perfectly rigid. The bearings are extra long and are designed either for grease lubrication from above or oil lubrication from an oil wick at the side. The motor is designed for either the Westinghouse cradle or nose suspension. Special frames can also be furnished for this motor with suspension designed with reference to use on large railroads where rapid inspection

tion of motors is important. The motor is so designed that by removing the axle caps and the pin from the suspension link it can be lowered into a pit. When this design of motor is used provision is made in the pit—in either car barn or shop—for a ram or jack screw, which lifts the motor into place on the car or lowers it into the pit. With this equipment it is the practice to substitute one motor for another under the car, the new motor having been previously inspected and the old motor being laid aside for inspection later. Provision is made for hinging the upper field, so that it can be raised and inspected while the motor is lying on the floor. In this manner a thorough inspection of all parts of the motor can be made with the greatest convenience, and the inspection does not have to be made at night or in a hurry, due to the fact that the car must be in service again in the shortest possible time. It has also been demonstrated that the time required for changing motors in this system is very much less than the time necessary for inspection of the motors beneath the car. Special provision is made for centering the motor on the head of the ram or screw referred to above. When a motor is properly centered in this manner, it can be raised to its exact position under the car and no time is necessary for adjustment.

Exhausters.—The New York Blower Company of Bucyrus, Ohio, have issued a very neat catalogue illustrating and describing their steel plate exhausters, which are made throughout of steel plate, reinforced with wrought iron angle frames, with the exception of the cast iron base plate, inlet and outlet rings. These appliances are regularly built to discharge horizontally or vertically at the top or bottom, and are carried in stock with the inlet on either side. Their double exhauster is composed of two machines united by a stout frame which also carries the bearings for the shaft upon the center of which is mounted the driving pulley. The arrangement is compact, and of course does away with one of the driving belts which would be required in two separate machines of like capacity. The outlet pipes may discharge in different directions, or they may both discharge in the same direction, as may be best suited to the conditions. All of these exhausters with overhung wheels larger than 60-inch size have rectangular outlets with which the manufacturers furnish transformation pieces, which make it possible to connect this discharge with round pipe.

A Prize Essay.

THE following essay on "Things I Learned While Stocktaking" is taken from the Australian *Ironmonger*. It received the first prize in a competition on this subject. While it brings out some excellent suggestions which might be followed to advantage in many Hardware stores, the essay is also interesting because of the use of terms which are not familiar to the American trade, and the evident adherence to methods which the trade have outgrown in this country. The general absence of shelf boxes or drawers will be noticed, as well as the continued practice of putting up many shelf goods in paper packages tied with string. Traveling ladders do not appear to be used, and the sampling shelf goods is apparently done to only a limited extent. The essay, however, will repay perusal:

Things I Learned While Stocktaking.

1. First, the necessity of thoroughness. Stocktaking being the time when all stock was handled, and probably parcels and articles examined in a way that time does not allow during ordinary business hours, it was essential that not one slip should be made, but everything turned out of hand should be perfect and ready for sale, or fit to be placed in the fixtures without requiring any additional attention.
2. To insure this, it was evident that overtime was necessary, as customers continually interrupted, making a chance of mistakes, preventing thorough examination of articles, and making stocktaking itself drag out for an indefinite period—a thing obviously undesirable.
3. Those firms whose assistants work till 9 o'clock each evening have their stock done almost as soon as those who work till 10 o'clock, and the workers do not have that tired, worn out look with them all the time.
4. Overtime being paid for, and not only tea money given, as in some instances, put interest in the work for all the assistants, they endeavoring to use their energies and care to prove that they had earned it.
5. It is necessary to take every parcel out of the hole or fixture—*a*, to make sure that no odd line, as Hooks,

Screws, broken Lock, is left out of sight; *b*, so that the hole may be swept, and it was noticed in doing this to be best to sprinkle with damp sawdust to prevent the dust from flying to other fixtures, and then to sweep direct on to the dustpan held at the edge of the hole, so as to prevent the dirt from falling on the parcels below; *c*, that parcels may be properly sorted.

6. All broken parcels should be opened—*a*, that as many original ones as possible may be made; *b*, that the contents may be thoroughly examined for shortages, as Locks without keys, or Barrel Bolts without staples, &c.; *c*, for sorting when lines, as Cup Hooks, Screws, Bolts, &c., are mixed; *d*, for taking out damaged articles not fit to sell at full price.

7. Careful parceling and dusting saves contents from damaging, so ragged parcels should have new paper and broken boxes be replaced by sound ones, and then be marked showing the nature and quantities of contents. If full quantities are in a parcel or box, the string should be tied in a knot, or the bow twisted under the fold of the paper or lid, to save time and labor when full parcels are required.

8. Fire and Box Irons, Crosscut and Circular Saws, all bright Steel goods, as well as Guns, Revolvers, &c., should be oiled to save from rust and kept in a dry place, and not downstairs where the damp gets to them. Wrought Kettles, Saucepans, &c., stained by straw, should be painted again with black, and if bruised should be straightened before putting into stock, thus preventing delay when required. Ice Chests, Wood Buckets, Mirrors and Wood Ware should not be placed on the top story where the sun plays on them, causing them to crack. Different sizes of lamp glasses should each have separate holes to prevent unnecessary handling and liability of breakage.

9. That ladders are the cause of a good deal of the untidiness of the stock, for if too long or short to reach the fixture they are leaned against the stock, pushing it out of place, and the assistant, grasping a corner of the parcel to pull it forward, tears it, or else leaves it pushed back in the holes.

10. When overstocks are made, tickets should always be placed over the stock hole to denote same; this prevents errors in double ordering, and often saves time in searching.

11. That samples should not be tied to stock parcels, but samples of Cutlery, Scissors, Pen and Pocket Knives, Razors, &c., should be kept in wrappers, and those of Hinges, all classes of Hooks, Screws, Locks, Bolts, &c., be fastened on boards, and placed so as to attract customers' attention; this will save considerable time in serving, and will prevent the customers from handling the stock, thus saving from tarnished and often damaged articles, and the mixing of the keys in the case of Locks.

12. When it is really necessary to show customers packages, as Sheep Shears, Shear Stones, Shovels, Spades, Handles, &c., to select from, only one parcel at a time should be opened, and not another till most of the contents of the first are sold, thus stopping an accumulation of lines well picked over which will need pushing later on.

13. That tins or boxes suitable to fixtures should be made to hold all classes of small lines constantly required, as Hinges, Screws, &c.; this will save time in serving, tying of parcels and keep the appearance of stock clean and attractive, as well as preventing two or three parcels of the one line being opened.

14. There should always be a counter for job or damaged articles, and the articles should be placed on this counter when noticed, and not allowed to wait till there is a large accumulation. All repairs when noticed should be put in the repair book; this will save keeping useless stock.

15. To prevent an accumulation of odd or obsolete lines, as special sizes and makes in Lamp Glasses, Sheep Shears, Nails, Varnishes, Cutlery, new inventions, &c., only sufficient to supply orders in hand should be purchased, remembering in all stock ordering that, with the speedy means of transport we have compared with the earlier days of the colonies, it does not pay to stock heavily.

16. It is best to have a price book containing the selling price of all lines, thus saving labor in making or altering prices on parcels, preventing errors, as prices are constantly torn off parcels and tickets, or parcels are overlooked in remarking, then a customer may have his list price direct from the desk without going round to the various fixtures, and in invoicing errors and guess-work are dropped.

17. As the stock of a hole is taken, it should be entered direct in the stock book and a ticket branded T fastened on the hole or fixture. Assistants in entering up these lines should mark their entries with a T in the sales book, and at the finish all T sales lines can be added up and deducted from the gross amount.

HARDWARE.

Combinations and Competition.

THE policy of buying up competitors, often adopted by pools or other strong combinations who seek to control the market in a given line of goods, is obviously attended with serious difficulties. It is not easy to find an example in which in the long run it has worked successfully. The usual course of such attempts is a measure of success for a time, the continual starting up of new enterprises, some of which are established for the purpose of being bought up or taken in, and at last a sudden collapse, with a demoralized market and a large overproduction. The trade are familiar with more than one pool in which this policy is now being pursued, and in such cases merchants are justified in exercising caution in their purchases. This is especially true where the combination is naming confessedly high prices for its goods and is at the same time under heavy expenses on account of buying out competitors or subsidizing them to keep out of the market.

The Effect of Prices on Sales.

There is a theory held by certain manufacturers that the demand for any staple article in a term of years is not materially affected by the price of the article—the argument being that the normal consumption is about so much, and that any heavy buying when the price is low is largely speculative and is offset by the diminished demand when the price is high. This theory fails to take into account the fact that would-be purchasers frequently go without an article when it is high in price, and, furthermore, articles of similar character, but lower in price, are frequently used in place of the one that has appreciated in cost; thus when Screws are very high Nails are substituted for them for certain purposes, and when Screws are very cheap they are frequently used in place of Nails. It would, of course, require an experience extending over a term of years of one article being very high in price and a similar article correspondingly low to determine as to how permanent a substitution of this nature would prove.

This theory will have an opportunity to receive a very good test in the case of Rope, Sisal and Manila having declined materially within the past year and Cotton Rope having materially advanced. In a similar way it will be seen whether or not the high prices maintained by the Scythe pool and the Shovel pool will seriously curtail the sale and consumption of these goods. The experience of the past, as, for example, in the case of Wire Nails and Barb Wire, indicates that exceptionally high prices have a serious effect in curtailing business.

Tone of the Hardware Market.

The Hardware market continues to be characterized by different tendencies in the matter of prices. In some heavy goods in which there has been a serious break in prices, under the influence of the decline in Iron, a better tone is apparent, and some of these lines are held more firmly. In a good many others an evident effort has been necessary to maintain prices, but the course of the market is such as to make it difficult to hold advances made during the upward movement of last year, and in such cases concessions are being gradually extorted from the manufacturers. Manufacturers who did not advance prices when so many others were doing so are generally congratulating themselves that the marketing of their products is unattended by the difficulties that others are encountering.

Volume of Business.

It is generally acknowledged that the near approach of the election is having the effect of still further limit-

ing business, and there is no doubt something of a falling off in the demand. From some points, however, the indications are that trade is continuing in remarkably good volume. Comparatively few heavy orders are, as a general rule, being placed, but both wholesale and retail merchants are buying fairly liberally in small quantities. The character of the orders indicates that only sufficient goods are purchased to keep stocks up to a fair working level, care being taken to avoid overbuying. The feeling that the general course of things will continue downward for a time emphasizes the wisdom of this policy. Most merchants, however, recognize the fact that if they are to sell goods they must have goods to sell, and to this end it will not do to let their assortments run down. There are accordingly a great many small orders being placed.

Special Reports.

Chicago.

(By Telegraph.)

The month of October has made a wonderful record for the local Hardware trade, proving, as it has, to be one of the best months ever known. The sales of Chicago jobbers are estimated to exceed those of last October by 25 per cent. This is very remarkable, as last October was considered a boom month with prices considerably above those now prevailing. A further fact to be taken into consideration is that the trade coming from the city of Chicago has been running very much below that of last year on account of the long strike in the building trades and the consequent heavy falling off in the local demand for all kinds of Hardware entering into the construction of buildings. The last week of the month, instead of showing a decline in the demand as had been expected in view of the proximity of the Presidential election, has shown an increase in orders both as to number and size. Merchants are buying a little more liberally, believing that prices are about as low as they can expect at present, and also being inspired with confidence in the future by the persistence of their own trade. The great bulk of business continues to be of hand to mouth character. Jobbers are themselves not buying more than enough to carry them through a week or two. The country is bare of stocks of all kinds. The very mild weather of almost the entire month has not proved to be an adverse influence, but if a change occurs to winter weather suddenly it is expected that the demand, large as it now is, will be greatly increased. The heavy trade is fully as active as Shelf Hardware and stocks are being drawn upon by large manufacturing consumers who ordinarily purchase directly from mills. The producers, however, are not making satisfactory deliveries on contracts, and it is continually necessary for jobbers' stocks to be drawn upon for shorts. Collections are very satisfactory and nothing of a discouraging character has either developed or is expected.

St. Louis.

The closing days of October have brought in an extent of business which enables jobbers to say that the month has made an unprecedented record. Some say it is not only a big October, but has scored as well the largest single month's sales in their history in value, tonnage and number of orders. There seems to be no indication that the activity will suffer an immediate check. The demand is great for prompt shipments and there is telegraphic evidence that jobbers as well as retailers find it difficult to secure quick action on their specifications and orders. The market seems quite steady and there is but little to cause comment. A

strong movement is seen in grain scoops, due largely to the extraordinary yields of corn. Carriage and Machine Bolts are stiff in price and said to be quite scarce. Stove Bolts are in good call. The late movement of Coal Hods, Stove Pipe and Boards is very pronounced and trade in Stove Pipe Sheet Steel is still in good shape. The sale of Poultry Netting to Southern points has made a good beginning. Galvanized Iron and Tin Plate is said to be somewhat hard to get from mills and price on the former is stiffening. As yet the trade is unable to obtain prices on Wire Screen Cloth, Window Screens and Doors, but it is expected that quotations will be made about the first of November. As usual, as the building season draws to a close, there is quite a tonnage of Sash Weights being called for. Trade in Heavy Hardware lines appears to be in quite good condition. Collections are said to be entirely satisfactory, especially as the South and West have had favorable crops and prices.

Philadelphia.

SUPPLEE HARDWARE COMPANY.—Trade during the past two weeks has continued fair and we hear of no complaint in wholesale business circles. Taking into consideration the near approach of the Presidential election, the continued activity in trade is looked upon as somewhat unusual. During a portion of September trade showed signs of hesitancy on the part of the buyers, but as time passed this seems to have passed away to a great extent, and there is now a greater feeling of encouragement. Locally some of our customers have stated that it is owing to the present outlook or indications of no change in the present administration. This, however, "no fellow" can find out until after November 6.

Looking backward four years ago we find we did suffer from depressed trade for a month preceding the Presidential election, but all admit that after the election there was a gradual advance in prosperity, which in process of time culminated in a couple of years of prosperity of an extent heretofore unknown in this country. Whether we have all profited by that, or whether the Hardware trade of the country have profited by it individually or as a whole, is best known to themselves. We are making the assertion, looking over the country as a whole, taking into consideration the present employed throughout the United States and comparing it with the million and a half of unemployed four years ago, making comparison from statistics of the advance in wages during the last four years, taking into account the increase of 33 1-3 per cent. in the deposits in savings banks throughout the United States, taking into consideration the millions of dollars of Western mortgages which have been paid off during the past four years, and considering as a whole the content throughout the country in comparison with the discontent that reigned supreme four years since. It is therefore no wonder, no matter what political faith a person is imbued with, that there naturally should be during quiet, sober moments a feeling of whether it would not be better to let well enough alone in order to see what the next four years may bring forth, and, as a manufacturer stated to the writer a short time ago, should not the paramount issue be prosperity, happiness and contentment, rather than how we should govern a nation thrust upon us through the exigencies of war, which question in the process of time must in itself find settlement?

It seems quite a coincidence that the business failures reported by the mercantile agencies during the past week have been less than compared with one year ago, the average probably during the past five weeks being about the same, but it shows one-third less failures than there were four years ago. The hardship of these failures is not read in the wording of statistics; to realize it one must think of the inconvenience and distress caused and the general uneasiness created in the country at large.

Locally we view the settlement of the anthracite coal strike with undisguised joy. The strike was ordered off by the president of the United Mine Workers' Union, to take effect October 29. This immediate employment of all mine workers, coupled with the 10 per cent. advance in wages, cannot be otherwise than locally quite beneficial, and creates a feeling of supreme content where uncertainty and unrest have prevailed during the past month. The strike involved the idleness of over 140,000 persons, and 120,000 at least will go to work on the 29th, the balance undoubtedly (as it looks now) within a few days.

There has been no change of price of any importance or interest to your readers in the last ten days, nor can the retail merchant, if in need of goods, afford to wait until January 1 to 20 (between two and three months) before providing himself with his daily wants, fearing there may be some softening of price three months hence.

Collections during the past ten days have apparently fallen off, and one is beginning to wonder whether people are holding onto their money until after the election or not, a coincidence we look upon as rather singular.

Cleveland.

THE W. BINGHAM COMPANY.—Trade has kept up remarkably well all through October. We have never known a Presidential election that has caused so little disturbance to business as the one about to take place, and we cannot help but believe that it argues well for the success of the Republican party. If a man is satisfied he makes no complaint, but goes ahead and attends to his own business and says nothing; but if he is dissatisfied he kicks and complains all the time, trying to make things different. We hear very little of that nowadays. There seems to be a general feeling of satisfaction all along the line. Prices are settling gradually, but surely. Season goods are moving very well, but some cold weather would no doubt help matters in these lines. Many things are awaiting the result of the election, but we do not look for much of an increase of trade until after the first of the year, even in the event of McKinley's election.

Boston.

BIGELOW & DOWSE COMPANY.—Trade since October 1 has been very satisfactory; the volume in bulk will exceed that of a year ago. Orders cover the whole line of Hardware. Usually one expects poor business the few weeks before the Presidential election, but there is an agreeable disappointment this year.

The extreme low prices ruling on many lines of goods which are nearest base material were 30 per cent. lower October 1 as compared with their value February 1. Figuring the value February 1 of 15 lines of goods comprising various kinds of Bolts and Lag Screws, Picks, S. and T Hinges, Sledge Hammers, Chain, Nails, Builders' Hardware, Sad Irons, Hatchets, Wire Goods and Cordage, they amounted in value to \$60,000. Their value October 1 was \$41,410.67. The declines on these various lines ranged from 22 to 58 per cent. The question is, Are not New England buyers discounting the election of McKinley? Considering the low prices ranging on some lines of goods, are they not wise in doing so?

A careful canvass of the dealers in Bicycles shows that nearly every one who sold wheels last year will continue this year. The average sold as many wheels in '99 as in '98. Many think they will sell more wheels in 1900 than in 1899. The proportion of cheap wheels as compared with the high grade is 75 to 80 per cent. This canvass is a source of satisfaction to many dealers and manufacturers who have expressed doubts as to the future of the Bicycle, and establishes the fact that it has come to stay.

John Bindley, president, and Mr. Fernley, secretary-treasurer, of the National Hardware Association, were honored guests of the New England Iron and Hardware Association at its last monthly dinner. The attendance

was large and all were very much interested in the lucid and practical remarks of Mr. Bindley, who explained to the members the importance of adding the fixed charges to the factory costs of Hardware. He explained that the salesman should always have this cost before him. He would not make an ironclad rule that no sales should be made at less than this advanced cost, but he would like the salesman to always know what he is doing, and claimed that under present conditions many were working under wrong impressions. Mr. Fernley's remarks were, as usual, instructive, facetious and interesting. His account of the royal reception given him by the members of the Canadian Hardware Association left no doubt in the minds of those present that he had been treated like a prince, and that he is an "expansionist" no one can gainsay who knows his deep interest in the welfare of all Hardware associations.

St. Paul.

FARWELL, OZMUN, KIRK & Co.—Trade conditions have been as favorable as expected, and the volume of business has not been disappointing. The weather, which had been very unfavorable from early July, changed early in October, and it is seldom that we have seen finer weather than has since been experienced. If this were to continue two or three weeks longer it would enable our farmers to thresh their grain and to prepare a very considerable acreage of land for next season's crops, both of which conditions are necessary for the coming year's business—to the merchants as well as to the farmers.

Part of the Northwest had a very short crop, and on that territory trade is affected this fall to some extent and collections are also very considerably reduced. Still the farmers, with their crops shortened, generally have some other resources, and business has not been as much affected as it was supposed would be the case.

Over a large part of the Northwest, and extending clear to the coast, crops are good, and trade and collections are satisfactory; so that, on the whole, the year's business will make a fair showing, the greatest drawback being the depreciation in prices which has been going on since April and which now seems to have been checked pretty generally along the line.

Omaha.

LEE-GLASS-ANDRESEN HARDWARE COMPANY.—The wheels of commerce still continue to run smoothly and with a rapidity surpassing that of 1899. Notwithstanding the usual drawbacks of a Presidential campaign, enterprise and business activity do not appear to be diminished or affected to any perceptible degree by the political contest now engaging the attention of the country. The facts are, the whole country continues remarkably prosperous, and as long as there is plenty of business in sight, backed by prosperous conditions, no fear need be entertained of any radical changes in the near future at least. We have no trade features of any special importance to report. A free movement of all kinds of merchandise still continues, and we expect that the year 1900 will wind up on the present satisfactory basis.

Portland, Oregon.

CORBETT, FAILING & ROBERTSON.—With but a very small proportion of last spring's wool clip sold and price of 10 to 13 cents now offered, where wool raisers a year ago were led to expect 20 cents, and wheat at tide-water selling at 52 cents per bushel, freight and sacks to come out, it does not seem our farmers can have a full "dinner pail" of "prosperity." For our hops a much better price is being paid than for years past. We have a good crop of fine quality this year that will atone in some degree for poor crops and low prices prevailing for some years past. Our mining interests are constantly forging to the front and now claim world-wide attention. It will in a few years be our leading industry.

We are interested in the New York commercial editorials regarding the Wire and Wire Nail situation. They show a profit of 100 per cent. to the manufacturers and certainly open up an inviting field for investors. The stockholders will, at a latter date, recognize the foresight of John W. Gates in his action of last April and regret, when too late, that they meanwhile have not met changing conditions as manufacturers in other lines have.

The Hardware trade in this section is enjoying a fair fall business, and the coming two months should wind up a fairly satisfactory year.

Louisville.

W. B. BELKNAP & Co.—The market is in a comfortable condition, notwithstanding the repeated assurances of the leading newspaper here that "something is going to happen November 6"—that is its exact phraseology. Further than this it does not venture a prediction or opinion, and in so far as that we can all coincide. This is made an excuse, however, by the trade for not laying in goods, and it operates something as the first of the month does with reference to a suit of new clothes or a haircut, just about that much.

There is a full current of small orders, and we think the trade at large is well satisfied with the outcome. Still, with the election once out of the way, there will be more satisfaction in planning for the future, and we look for an expansion commercially and in a manufacturing way, despite any efforts of non-expansionists.

Nashville.

THE GRAY & DUDLEY HARDWARE COMPANY.—Inquiry among the Hardware houses in this city develops the fact that the October business is fully equal to any previous October. Orders are coming in freely from all sections of the country, but those from the cotton section seem to embrace a larger assortment and larger quantities are wanted.

It is generally remarked that politics has in no way interfered with business in this section, as no interest whatever is being manifested in the Presidential election. We think this augurs well for our future prosperity. Trade conditions here are generally satisfactory.

New Orleans.

A. BALDWIN & Co.—Business continues very active, notwithstanding the slight falling off in the price of the leading staple. The demand for goods has been exceptionally heavy for the past 30 days. Orders are still coming in very freely and for a much larger assortment of goods than we have been accustomed to receive for some time back.

We expect a continuance of the present favorable conditions, and the output of product within the next three or four months will be the heaviest in the history of this section of the country. All the conditions are so favorable that the country merchants are not hesitating in buying very liberally.

Notes on Prices.

Wire Nails.—Quite a large volume of Wire Nails are moving, made up, for the most part, of small lots for immediate shipment. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

To jobbers in carload lots.....	\$2.20
To jobbers in less than carload lots.....	2.25
To retailers in carload lots.....	2.30
To retailers in less than carload lots.....	2.40

New York.—Wire Nails, in small lots from store, continue in active demand. Local prices are well maintained. Quotations are as follows:

To retailers, carloads on dock.....	\$2.48
Small lots from store.....	2.55

Chicago, by Telegraph.—The American Steel & Wire Company have started up their Nail factory at Salem, Ohio, this week, to help them fill the pressing demand

for Nails. All the company's local factories are running, but some of them are not on full time because of shortage of material, while the demand appears to grow instead of falling off as might be expected at this season and so close to election. The sales of the past week have been very heavy, considerably in excess of the previous week. Jobbers also report a large trade, keeping up in volume to the excellent business reported almost every week for several months. Prices are firm at \$2.35 for carload lots, and the usual advance for small lots.

St. Louis.—Shipments of Wire Nails are heavy. Miscellaneous orders from the trade in nearly every instance carry specifications for Wire Nails, and demonstrate shortage in dealers' stocks. Mills are said to be considerably behind in making shipments. Price in carloads to retailers is \$2.40, base; smaller quantities, \$2.45, base.

Pittsburgh.—There is a continued active demand for Wire Nails, but mostly for small lots. However, we are advised that more carload orders are being placed than for some time. Prices are firm, and there is very little shading of prices in small lots. We quote, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

To jobbers in carload lots.....	\$2.20
To jobbers in less than carload lots.....	2.25
To retailers in carload lots.....	2.30
To retailers in less than carload lots.....	2.40

Cut Nails.—At a meeting of the Cut Nail manufacturers held last week October prices were reaffirmed for November delivery. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, 2 per cent. off in 10 days:

Carload lots.....	\$1.95
To jobbers in less than carload lots.....	2.00
To retailers in less than carload lots.....	2.10

New York.—Local demand keeps up to fair proportions. Some jobbers complain of the difficulty of obtaining prompt shipments of Cut Nails from factory. Prices are as follows:

To jobbers in carload lots on dock.....	\$2.13
To jobbers in less than carload lots on dock.....	2.18
To retailers in less than carload lots on dock.....	2.31
Small lots from store.....	2.25

Chicago, by Telegraph.—The demand for Cut Nails shows no falling off, but, on the contrary, the proportion of such Nails sold is steadily increasing. Prices are continued at \$2.25 for small lots from stock.

St. Louis.—There has been no change in the nature of demand for Cut Nails. The volume is quite good at no change in price. Price is \$2.30 to \$2.40, base.

Pittsburgh.—There is a fair demand for Cut Nails and prices are being better observed than for some time. We quote, f.o.b. Pittsburgh, terms 60 days, 2 per cent. off in 10 days, as follows: Carload lots, \$1.95; jobbers, less than carload lots, \$2.

Barb Wire.—The Barb Wire market continues dull and uninteresting. Demand is light and quotations remain unchanged, as follows, f.o.b. Pittsburgh, net cash 60 days, or 2 per cent. discount for cash in 10 days:

To jobbers in carload lots, Painted.....	\$2.50
To jobbers in carload lots, Galvanized.....	2.80
To jobbers in less than carload lots, Painted.....	2.55
To jobbers in less than carload lots, Galvanized....	2.85
To retailers in carload lots, Painted.....	2.60
To retailers in carload lots, Galvanized.....	2.90
To retailers in less than carload lots, Painted.....	2.70
To retailers in less than carload lots, Galvanized...	3.00

Ellwood and Baker Wire is 5 cents and Washburn & Moen Glidden 10 cents per 100 higher than the foregoing prices.

Chicago, by Telegraph.—The volume of business in Barb Wire for shipment from factory is as large as in previous weeks, and the steadiness with which orders are being booked indicates that the demand will continue. Jobbers are also looking for a steady trade running into the winter. Prices are continued at \$2.70 for Painted and \$3 for Galvanized Wire from stock, with the usual reduction on carload lots.

St. Louis.—A fair tonnage of Barb Wire is in action, some of the independent mills particularly being in receipt of an excellent business. Price of Painted in carloads to retailers is \$2.70; smaller lots, \$2.75. Galvanized commands an advance of 30 cents on these prices.

Pittsburgh.—There is very little doing in Barb Wire for domestic trade, but we note a continued good export demand. We quote as follows: Galvanized Barb Wire, \$2.80, in carload lots to jobbers, and Painted, \$2.50. Terms, 60 days net, 2 per cent. discount for cash in 10 days, f.o.b. Pittsburgh.

Plain Wire.—There is only a fair demand for Plain Wire. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. off for cash in 10 days:

	Base sizes.	
	Plain.	Galv.
To jobbers in carload lots.....	\$2.15	\$2.55
To jobbers in less than carload lots.....	2.20	2.60
To retailers in carload lots.....	2.25	2.65
To retailers in less than carload lots.....	2.35	2.75

The above prices are for the base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the advances indicated in the following table:

Plain Fence Wire Advances (Catch Weights).			
Nos.	Base	Galvanized.	
6 to 9.....	\$0.05 advance over base.....	\$0.40 extra.	
10.....	.10 " " " "	.40 "	
11.....	.15 " " " "	.40 "	
12 and 12½.....	.25 " " " "	.40 "	
13.....	.35 " " " "	.40 "	
14.....	.45 " " " "	.75 "	
15.....	.55 " " " "	.75 "	
16.....	.70 " " " "	1.00 "	
17.....	.85 " " " "	1.00 "	

For even weight bundles, 50 pounds and over, 5 cents per bundle advance on above.

Chicago, by Telegraph.—The large movement in Plain Wire is a strong feature of the Wire trade. Orders for straight carload lots are unusually numerous. Jobbers report an excellent demand. Small lots, Chicago delivery, are quoted at \$2.35, base.

Pittsburgh.—There is a moderate demand in Plain Wire, but mostly for small lots. We quote:

	Plain.
To jobbers in carload lots.....	\$2.15
To jobbers in less than carload lots.....	2.20
To retailers in carload lots.....	2.25
To retailers in less than carload lots.....	2.35

Galvanized Wire up to No. 14 is 40 cents advance on Plain, Nos. 15 and 16, 75 cents advance, and Nos. 17 and 18, \$1 advance. Terms are 60 days net, with 2 per cent. discount allowed for cash if paid in 10 days from date of invoice.

Nickel Plated Screws.—The manufacturers of Nickel Plated Screws abandoned September 26 the special list for these goods, which are now sold from the regular Iron Wood Screw list.

Carriage Bolts, Machine Bolts, &c.—The market on this line of goods, which has of late been characterized by a somewhat weak tone, is now in an improved condition. The manufacturers have been conferring in regard to the situation and as a result some of the extreme prices have been withdrawn and higher quotations adopted. The lowest prices which have recently been current are accordingly no longer obtainable and there is more regularity in prices. The market for small lots is represented in a general way by the following quotations, an extra 10 per cent. being obtainable by larger buyers. Terms 60 days or 2 per cent. discount for cash in 10 days:

Common Carriage Bolts.....	.75 and 10 %
Bolt Ends, with H. P. or C. P. Plain Nuts.....	.80 %
Bolt Ends, with C. & T. Nuts.....	.75 and 10 %
Machine Bolts, with H. P. or C. P. Plain Nuts.....	.80 %
Machine Bolts, with C. & T. Nuts.....	.75 and 10 %
Machine Bolts, without Nuts.....	.80 and 10 %
Plow Bolts.....	.65 %
Forged Set Screws and Tap Bolts.....	.70 and 5 %

Coach and Lag Screws.—The market on Coach and Lag Screws is characterized by a somewhat firmer tone and manufacturers' current prices to the retail trade are

as follows, an additional 10 per cent. being given to the jobbers. Terms 60 days or 2 per cent. discount for cash in 10 days:

G. P. Coach Screws.....	80 and 15 %
Cone Point Lag Screws.....	80 and 20 %
Skein Screws.....	80 and 15 %

Builders' Hardware.—The understanding between the prominent manufacturers of Builders' Hardware is being carried out with fairly satisfactory results and the market, as a whole, gives them little reason for complaint. In view of the fact that some of the cheap Rim Locks are subject to special competition, there being manufacturers of these goods who are not identified with the association, the market on these goods has been made an open one. Mineral Knobs are also removed from association control.

Wire Picture Cord.—In view of the differences between the manufacturers, as illustrated in the matter of lists, to which we have already referred, somewhat lower prices have developed on Wire Picture Cord and the market is not characterized by a confident tone.

Poultry Netting.—The trade are looking forward with interest to the meeting, November 9, of the manufacturers of Poultry Netting, when it is expected that prices for the coming season will be determined. It will be remembered that at the last meeting of the association it was decided not to accept any orders for execution after November 9.

Bright Wire Goods.—The associated manufacturers of Bright Wire Goods have abandoned the plan adopted some time ago for the marketing of their goods, under which the trade were divided into three classes, A, B and C. Classes B and C have been abolished, and the only price now formally determined upon by the association is the extreme price to which the large houses on the A list are entitled. In view of the competition existing relatively small houses are now able to obtain pretty close prices. There are also rumors that some irregularities exist, concessions being made beyond what is the extreme price of the association.

Hot Pressed Nuts.—The market for Hot Pressed Nuts is in a somewhat improved condition, as extreme prices which have been current have been withdrawn. The market in a general way is represented by the following quotations for either Blank or Tapped Nuts, an extra one-tenth or two-tenths being obtainable by larger buyers:

Square.....	6.2 cents off list
Hexagon.....	7 cents off list

Hay Knives.—The manufacturers of Hay Knives have been in conference and as a result have reached an agreement in regard to prices. Something of an advance has thus been determined upon.

Glass.—The Glass market is without any especially new or interesting features. Demand is light in this locality and stocks are apparently sufficient for all demands made upon them. Discounts, for small lots, from the jobbers' list of September 1, which are uniform over the entire country, are as follows:

All single strength.....	85 and 25 %
All double strength.....	85 and 25 and 5 %

Paints and Colors.—*Leads.*—It is probable that a large number of orders were placed for White Lead in Oil previous to the advance last week. The mild weather has been favorable for a continuation of outside work which, it is fair to assume, would be larger if Linseed Oil had not been so high in price. Quotations are as follows: In lots of 500 pounds and over, 6½ cents; in lots of less than 500 pounds, 7 cents per pound.

Oils.—*Linseed Oil.*—While there is no quotable change in the price of Linseed Oil, the market does not show the strength it did immediately after the recent advances. The trade are entirely at sea regarding the future of Oil and are conservative in their purchases.

Spot Oil is not abundant, but it is expected that this condition will be overcome to some extent in the course of a few weeks. Prices for December delivery are reported as being considerably lower than those now ruling. Demand is light and only for immediate necessities. Quotations are as follows: City Raw, in lots of five barrels or more, 75 cents; in lots of less than five barrels, 76 cents. State and Western brands are obtainable in ten-barrel lots at 73 to 74 cents per gallon.

Spirits Turpentine.—Light local stocks and scarcity of freight room from Savannah have kept the Turpentine market firm at this point. Consumers are not in the market to any extent and demand is confined to jobbing lots. Southern brands are held at 44 cents, and machine made barrels at 44½ cents per gallon.

David Kelley.

THE Western Heavy Hardware trade has lost a prominent member in the death of David Kelley, president of Kelly, Maus & Co., Chicago, who died on October 25 at his home in that city. Mr. Kelley was born in Conway, N. H., in 1829, was educated in the local public schools and began his business career in Massachusetts. In 1848 the gold fields of California attracted him and he became one of the argonauts. The venture proved remark-



DAVID KELLEY.

ably successful and enabled him to lay the foundation for his subsequent prosperous career. In 1854 he married and removed to Davenport, Iowa, where, in connection with his brothers, Asa P. and Moses, he conducted a large market. When the war broke out they made heavy contracts with the Government for supplying the army with provisions. In 1863 he removed to Chicago and engaged extensively in the lumber business. In 1877 he bought the Hardware business of W. C. Barker. Two years later the firm of Kelley, Maus & Co. were organized. Mr. Kelley was a director in the Union National Bank and for several years was vice-president of the institution. He was a very energetic business man and was interested in other commercial enterprises of importance besides the Hardware house with which his name has so long been identified. He was further a director and trustee of several charitable organizations. Mr. Kelley was a man of genial temperament, and his death is deeply regretted by a large circle of warm friends, while his loss will be felt in the many public institutions and charitable associations that had the benefit of his counsel and liberality. A widow and two sons survive him. His sons are connected with Kelley, Maus & Co., Addison D. Kelley being treasurer of the corporation, and Paul D. Kelley, assistant treasurer.

Exports to England.

THE following letter from an American merchant prominently connected with the trades of which he writes will be of interest as suggesting lines on which there are opportunities for trade with England:

The English Iron and Steel market is being rapidly invaded by the progressive American, and if present conditions maintain it cannot be many years before the British manufacturer will, in a large measure, lose control of his home market.

RAW MATERIALS AND FINISHED GOODS.—While this is more particularly true of raw materials, the finished product is now finding its way into the very heart of the metal producing centers of Great Britain. American Plate and Bar Iron, to say nothing of Rails, is being regularly imported at much less cost than similar goods can be produced for at home.

TIN PLATES.—In the Welsh Tin Plate district a rather peculiar state of affairs exists. Of the large number of plants located there which formerly supplied the world with Plates, a great many are closed, some have been dismantled, some have failed and others are out of existence. Those plants which are in operation are not being run to their full capacity. This condition is due almost entirely to the severe American competition, which has made such frightful inroads on the Welsh trade. Tin Plate Bars from the United States are being regularly imported by the Welsh makers, as such Bars cut to requisite dimensions are now being laid down in Swansea, which is the shipping center for the district, at considerably less than the home article can be produced for.

ROOFING.—Strange as it may seem, there is hardly a sheet of Roofing Tin consumed in Great Britain, climatic conditions favoring the use of other forms of roofing, such as Slate, Tile, Sheet Lead, Sheet Copper, &c. Even in the Tin Plate section many towns have building regulations requiring the exclusive use of slate and tile. In consequence of this the Welsh maker has never had a fair opportunity to study the various conditions surrounding the use of Terne Plate.

While it is generally supposed at home that Iron body Roofing Plates are being made to-day and can still be imported, it is erroneous, as I was informed on undoubted authority that the manufacture of such Plates had been abandoned 15 or 20 years ago, and that the plants that were equipped for producing Iron Bars or Billets had been dismantled or changed into Steel producing ones.

For temporary buildings, sidings and cheap roofing, flat and corrugated Galvanized Sheets are quite extensively put on, but the corrugations are larger than our standard, measuring about 3 or 3½ inches. This style of corrugation gives a very attractive appearance when laid.

HEATING GOODS.—In Heating Goods the most approved forms of steam radiation are being adopted. Hot water and hot air Heaters are coming into constant use, though the old fashioned fire place is still largely used as a mode of heating.

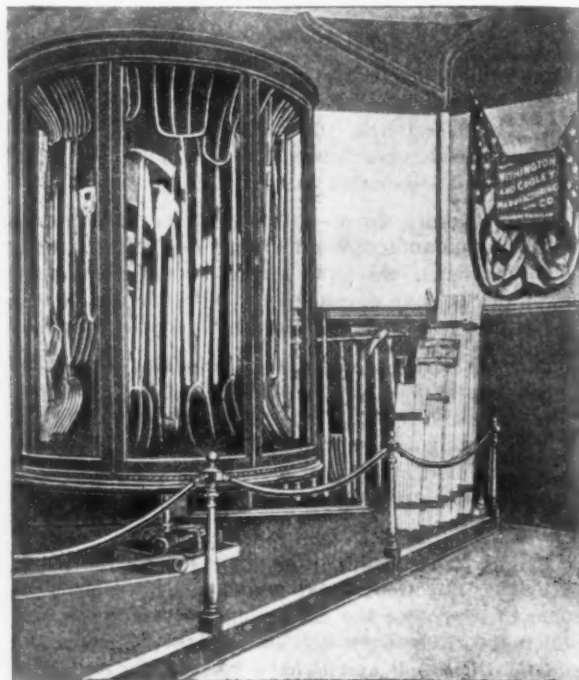
QUALITY OF TINWARE.—Tinware is made only from the best and heaviest plates, and in a very careful manner. You do not see cheap or inferior articles for sale. Large quantities of Milk Cans are used to transport milk to London and other centers, but the Cans are smaller as a rule than ours and of a different design, being flaring from the bottom up. Brass and Copper utensils still hold their own as articles of daily use.

SECURING FOREIGN BUSINESS.—Unless there should be a great change in cost of production, the American metal merchant is bound to find an outlet for his wares in Great Britain, but the quality of articles so applied must be first class and kept up to known and reputable standards of excellence. The dealer who seeks foreign trade must acquaint himself personally with the needs of his new customers and learn as far as possible to cater to their requirements.

Hardware Exhibits at Paris.

Withington & Cooley Mfg. Company.

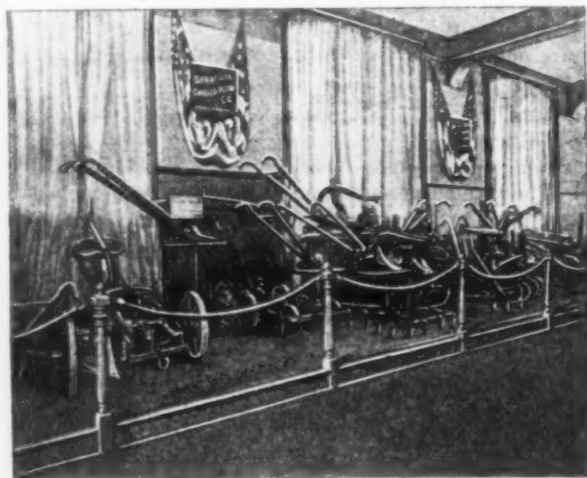
The Withington & Cooley Mfg. Company, Jackson, Mich., make a handsome exhibit of Farm and Garden Tools, using for this purpose a revolving glass case, in which Garden Rakes, Hoes, Forks, Corn Hooks, Potato Scoops, and a variety of other small tools are displayed.



A number of Fork Handles of various patterns are artistically placed against the walls. The exhibit is in charge of their Paris agent.

Syracuse Chilled Plow Company,

Syracuse, N. Y., occupy one of the coziest nooks in the Implement Annex. Their exhibit comprises a line of Level Land Plows, Steel and Chilled Moldboards, Hill-side Plows, Harrows, Cultivators, Stove Trucks and Wheelbarrows. They also show Sulky and Gang Plows.



One of the features is the "gold" Plow, made for the Chicago World's Fair in 1893, and which has been displayed in different parts of the world since that time.

Standard Caster & Wheel Company,

318-326 East Twenty-third street, New York, occupy one section with specimens of their various Ball Bearing Casters. From the nature of the articles it is not easy to make an attractive display, but the exhibit has been made interesting to men in the trade by showing the construction of the Casters and their various parts. The larger part of the company's output consists of Hollow Wheels, stamped out in two parts, which are

interlocked at the periphery. An interior piece strengthens the rim and secures smooth running, as it forms a part of the hub through which the pin passes.

From a British Correspondent.

The Question of Agency.

IT is an odd coincidence that about the time I was commenting upon the importance of starting British trade on right lines so far as agency is concerned, in another American quarter the same question was being discussed and the same conclusions practically arrived at. In the case to which I refer one conclusion is not to be too greedy. It is pointed out that to let an agent work up business for the first two or three years and then, when it is on a firm basis, to change the agent, or in the alternative to appoint a direct representative, is not the way to inspire confidence.

DON'T BE TOO GREEDY.—In short, in dealing with agents the moral is not to be too greedy. The point I made a fortnight ago was either to do the business direct or to appoint an agent who gives every guarantee that he will put his back into the work. The average commission man, who has a small army of other commissions, is generally not the right man to select, although he may have an excellent connection. Your particular commodity becomes one of many, and the consequence is that only small sales are effected, and the expected trade connection fades away into a mere elusive hope. It is well worth while to pay a special journey to this country, and to wait until the right agent comes along, rather than to appoint some man who is not obviously the exact fit for the job.

NATURE OF THE ARTICLE.—As I have said on more than one occasion previously, much depends upon the nature of the article to be sold. If it is a small novelty, then the agent holds the whip end; but if it is a valuable piece of merchandise of permanent utility it is my conviction, from careful observation, that it is better to go slowly and first build up the trade on a sound footing, and thus be secured from being compelled to change policy after a few years' experimentation. There are three or four men at the present moment who are known to me personally whom I would always recommend if asked.

A COMMON MISTAKE.—But just as a good many English travelers have gone to America under the impression that they have only to ask for the trade and it will be given them, so, conversely, there are a large number of American manufacturers who have really neat and valuable goods for sale who come over here thinking the same thoughts. Both are wrong; it is a serious undertaking and must be approached circumspectly. The trade can be done, of that I have no shadow of a doubt; but I respectfully urge upon American manufacturers and jobbers that it is even more difficult to get trade in England than almost anywhere on the face of the earth. The beauty of the British trade is if once you make friends with British buyers they stand by you with something approaching fidelity. Then again their money is sure, and the means of transport not difficult.

The Freight Rate Difficulty.

A good deal of attention is being given over here at the present moment to the question of freight rates from America and Canada. In a former letter I indicated that negotiations were going on so far as Montreal is concerned, and I was then hopeful that something would be done to make it easy to transport from that side. The Elder Dempster Steamship Company are now apparently hopeless of gaining any concessions, while the marine insurance rate is advanced. The company are now looking to Boston and Quebec rather than to Montreal, and I understand that at the next meeting of the company, to be held shortly at Liverpool, a definite recommendation will be made that the company establish a line of ships between Boston and Liv-

erpool. The abolition of harbor dues at Quebec may influence the company in that direction. The point, however, so far as the Hardware exporter is concerned, is to watch for the cheapest freight, which may be either Quebec or Boston.

The Present State of the British Hardware Market.

The Hardware trade over here at the present moment may be described as from middling to good. There is a brisk demand for Cut and Wrought Nails, Nuts, Bolts, Screws and Rivets. Wire Netting is being bought greedily by Australia and New Zealand, and in the Wire working shops Fire Guards and Nursery Fenders are in great request. From the seaboard, such as Newport, Cardiff, Liverpool and Glasgow, fairly large consignments of Galvanized Sheets are being sent to India, Chile, the Argentine Republic and New South Wales. So far as export is concerned, however, the bulk of the trade at the present moment in such goods as Fencing, Iron, Galvanized Roofing Sheets, Edged Tools and general Hardware is going to India and Australia.

TIN PLATES.—There are several inquiries from Canada for Cutlery and Tin Plates, and it is curious that, while the Tin Plate trade in South Wales is still in a parlous condition, they do not seem able to supply Canada with what she wants. South Wales Tin Plate makers are in a quandary as to the real policy of the American Tin Plate consolidation. Welsh Tin Plates were selling at 16 shillings 6 pence per box until they began to buy American Steel Bars, and now they are actually selling at 13 shillings 6 pence. The result is that the export of South Wales Tin Plates to America has lately been on the increase. Last month the exports rose to 7000 tons, as compared with 3000 tons in September, 1898. On the nine months' trading, as compared with 1899, there is an increase of 3000 tons. And the curious thing about it is that on the total exports of Tin Plate during the month of September there is a decrease of 3000 tons, although on the nine months' trading there is an increase of 23,000 tons.

British Hardware to America.

The exports of British Hardware from Birmingham to America continue to show a decline, but there is still more business being done than would be expected. During the quarter ended September 30 Birmingham sent to America \$3500 worth of Anvils, \$720 worth of Bedsteads, \$900 worth of Cycle Parts, fancy goods, \$9000; Guns and Parts, \$5500; Hardware, \$20,000; Hoes, \$2100; Steel Tubes, \$5500. From the Kidderminster district \$600 worth of Hardware was declared, and from the Wolverhampton district \$1600 worth of Hardware, \$600 worth of Steel Tubes and \$8000 worth of Tiles and Earthen Ware.

Acetylene Lamps.

I would like to draw the attention of American makers to the increased sale over here of Acetylene Lamps. On my last trip in America I was struck with the superiority of the American Acetylene Lamps, particularly for cycles. There are several firms like Gamages who are open to make big contracts with American makers. I have spoken to two or three cyclists upon the subject and find general satisfaction with the few Acetylene Lamps which have come from the States. There is still room for a big sale, and now that prices over here rule very high there is an excellent opportunity to cut in and capture some of the business. In addition to the Cycle Lamps, there is increasing demand for Acetylene Table Lamps. If there is any maker of Acetylene Lamps in America who wants to start I should be glad to hear from him.

The Wrong Sort of Catalogues.

I have received from a large American manufacturing house a neatly arranged catalogue of Electric Fittings, and I gather that they have been sent to others in this country. They seem to be the right kind of articles for this market, so far as I can see, but the prices are

all set forth in American currency. This is useless. Over here we deal in pounds, shillings, pence and not in dollars, and it only distracts buyers and sets them against the American article. The circular starts, "We are making the following low prices to agents for cash," and then follows a considerable list of cheap lines. As I have pointed out, business cannot be done in this way. Agents will not buy if they think the man round the corner is being put upon the same terms; they are far too much afraid of undercutting. And in the same connection I should like to drop another hint. The front page of the catalogue is covered with some lurid claims to superlative excellence, while the portrait of the owner of the firm also graces the printed communication. British buyers are not favorably impressed with this sort of thing. They incline rather to the commonplace, and when this sort of circular is placed before them they shrug their shoulders, mutter something about "American spread eagleism," and the waste paper basket and the catalogue become locked in each other's embrace.

Wanting American Commissions.

I have recently been commenting upon trade in South Africa, and there was a good deal more to be said. A few days ago an English gentleman called upon me asking for introductions to American houses who want to do a South African trade, as he is just going out there and wants to carry some American commissions. The eternal difficulty is, of course, the question of expenses. There is no doubt that a good trade can be done, but the question is, At what price? The gentleman in question is known to me as being of the highest reputation, and he can give satisfactory references in New York City with houses with whom he has dealt formerly. He proposes to make Cape Town his chief center, and to work South Africa systematically.

No Reduction Yet.

Although we are constantly expecting a reduction all round in prices, none has as yet been announced. Hardware prices over here still rule high, and I do not think there is much probability of seeing any substantial reduction before next spring. I think that Iron and Steel will come down with a clatter before very long, but the makers of metal goods and the jobbers will keep up prices as long as they possibly can to get back much that they lost in the early days of the boom, when they were too slow to raise their prices in view of the advance in the cost of raw material and labor.

Cultivating Holiday Trade.

WE have an inquiry from an enterprising house in Indiana in regard to cultivating holiday trade. The points on which they desire expression from merchants are the following:

Is it desirable to make a special effort to obtain Holiday and Christmas trade?

What plans do wide awake merchants adopt to build up such business?

What articles can advantageously be made prominent as Christmas gifts?

This is a seasonable topic and we ask prompt replies so that in the next few weeks we can lay before our readers suggestions from many merchants. It will obviously be for the advantage of the trade to have the subject thoroughly canvassed. The more practical and definite the suggestions are the more helpful they are likely to be.

McLean & Whiteford have succeeded Bridges Hardware Company, Savannah, Mo. The new firm have remodeled the store and report business as good.

Letters from the Trade.

Our readers are invited to discuss in these columns questions of trade interest connected with the manufacture or sale of Hardware. We shall be pleased to have a free expression of opinion on subjects deserving the attention of Hardware merchants and manufacturers.

Sisal and Cotton Rope.

A correspondent touches upon the question as to the effect which the fluctuations in the price of Sisal and Cotton Rope will probably have on the demand:

Sisal Rope has declined about 40 per cent. from the highest point it reached during the closing of the Philippine ports, while Cotton Rope has advanced about 30 per cent. within the past three months.

One factor has largely to be taken into consideration—that of sentiment—since Cotton Rope is largely used because it is soft and pleasant to handle, while Sisal Rope is harsh and hard. The objection that Sisal Rope gets kinky and knotty when wet can be met by the statement that Cotton Rope under similar conditions becomes soggy and is very hard to dry.

The decline in the price of Sisal Rope has been accompanied by a steady and constantly increasing demand, while the supply of Cotton Rope will probably be materially decreased, since this Rope is a by-product of many of the mills who cannot afford to put high priced material into it.

It will be interesting to watch the developments of the coming season as to whether Sisal Rope will make any serious inroads in the use of Cotton Rope.

Manufacturers' Help in the Retailer's Advertising.

Some manufacturers, as the trade are aware, are sending out suggestions in regard to the way in which their goods, principally in the line of specialties, can be advantageously presented in advertisements in the local papers. In some cases they go so far as to furnish electrotypes which can be used in this way. Touching on this general subject we have this comment from a well known Western house:

We wish to commend these manufacturers—of specialties in particular—who are sending to the trade booklets and sheets of short, well written advertisements of their wares.

This is certainly a great help to the retailer, as few of us have the time or training necessary to "born" a good advertisement. The manufacturer of an article can certainly present its need, merit, and selling quality better than any one else. Would suggest that more manufacturers adopt this plan, thus benefiting themselves, the retailer and consumer.

Changes in Hardware Goods.

From a prominent Hardware merchant in close touch with the trade we have the following suggestions with reference to several lines concerning which he observes certain features of practical interest:

IRON CUT NAILS.

A curious feature of the Nail business is a revival in the demand for the old Iron Cut Nail. It is well known that soft steel rusts much more quickly when exposed to the weather than does wrought iron, so where Steel Cut and Steel Wire Nails are used for outside work it has been discovered that they oxidize much sooner than do the old Iron Cut Nails.

The most serious form this new demand has taken is for the Shingling Nail 3d and 4d, of which a great number are sold. There is also some little demand for Fence Nails, though the barbed wire fence has practically killed the sale of all Fence Nails.

The Wire Nail people have met this competition with a Galvanized Wire Shingling Nail, having a large head and small shank, and being thoroughly galvanized after being made. It seems to be a success.

POULTRY NETTING.

The approach of the Poultry Netting season brings up the question as to the comparative merits of Netting galvanized before and Netting galvanized after weaving. The advocates of Netting galvanized before weaving contend that the Wire is coated at the point of contact, hence cannot rust there. On the other hand, those who believe that the Netting galvanized after weaving is preferable, state that in the first place it is better and more heavily galvanized, and in the second, that if it is well woven it cannot be stretched so as to disclose the ungalvanized spaces at the point of contact, and there is no danger whatever, consequently, of its rusting at these points. Meanwhile, the demand for the Netting

County Fair Window Display.

C. Magnussen of Lyons, Iowa, arranged quite an elaborate window display, as shown in the accompanying cut, and had it in operation during the time of the recent county fair. The show window is a large one, and permitted the placing of two life size figures with a number of accessories. At the right of the window was the figure of a farmer seated on a Foot Power Grindstone, and in the act of grinding a Scythe. Beside him was a wood pile, chopping block, Axe and Wood Saw, while near by was a Barrel Churn. At the front and near the center of the window was a cradle containing a stuffed colored baby, which automatically rolled its eyes. This was labeled "Adopted Child." On the left of the window was the figure of an attractive German peasant woman, with short skirts and wooden shoes, operating a Washing Machine. In front of the Washer stood a stuffed goose. The background was made up of Iowa corn 14 feet high. The machines were attached by small belts to a main shaft, which extended across the



County Fair Window Display

galvanized after weaving is apparently on the increase, especially in the territory west of the Mississippi River.

PICTURE NAILS.

It is interesting to note the great decline in the use of Picture Nails incident to the custom of having molding strips in all the modern dwellings, consequently no one defaces the walls by driving in Picture Nails, but instead hangs the pictures from the molding by means of a Picture Hook. This means not only the decrease in the use of Picture Nails but also a great increase in the sale of Picture Hooks.

Laughlin Nail Company.

WE have been officially advised by the Laughlin Nail Company that they have closed down their Shovel works at Martin's Ferry, Ohio, having entered into an arrangement with the Shovel Association by which their works are to remain idle. The concern state that they have not sold their Shovel plant, but for satisfactory reasons have concluded not to operate it at this time in competition with Shovel plants belonging to the association. As probably known, the Laughlin Nail Company operate at Martin's Ferry a Bessemer Steel Cut Nail factory containing about 225 machines, said to be the largest Cut Nail factory in the world. We may also note that this concern expect to commence work before long on a large addition to their present plant, and will install a large number of Wire Nail machines and enter upon the manufacture of Wire Nails.

CONTINENTAL TOOL COMPANY, Frankfort, N. Y., have, as the result of negotiations with the Shovel pool, decided to discontinue the manufacture of Shovels, Spades, &c., and will hereafter devote their entire attention to the manufacture of their line of Steel goods.

window to a concealed 1 horse-power gasoline engine, which furnished the power for operating them. When the display was in operation, the farmer sharpened his Scythe, the peasant woman worked the Washing Machine, the Churn revolved and the cradle rocked. The display attracted universal attention from the townspeople, but made the most pronounced hit with the farmers and their wives.

A New Shovel Factory.

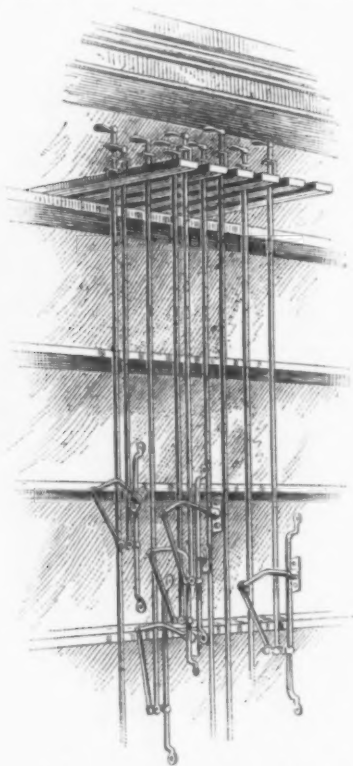
A NNOUNCEMENT is made that the Collier Shovel Company, Washington, Ind., have been organized for the manufacture of Shovels, Spades, &c. They expect to be in operation by January 1, making a full line of Smooth and Hollow Back goods. The company are composed of the following parties: C. Collier, L. H. O'Donnell, R. C. Davis and A. F. Cable.

W. J. GLUCKERT & Co., 102 Chambers street, New York, have been made the sole agents for the Lang Cutlery Works, Cedar Rapids, Iowa, for New York and Eastern territory, as well as for export. This concern are manufacturers of high grade steel laid Shears in straight, bent barbers' and bankers' styles. A feature of this make of Shear is the right and left bolt with tension spring, patented by them. Owing to the demands of their business they have erected a new factory which they are about to move into. This firm are also selling agents for New York and surrounding territory and export for Emmert Hartzell, Fairfield, Pa., who make hammer forged Butchers' Cutlery and Bread Knives in a large variety of patterns and sizes. Especial attention is called to the fact that the blades of these Knives are hand hammer forged. A full assorted stock of both of these makes is carried at the Eastern headquarters, the address of which is given above.

Hardware Store Arrangement.

Arrangement of Transom Lifters.

FOR their retail stock of Transom Lifters Tracy & Robinson of Hartford, Conn., use the arrangement shown in the accompanying cut. Wooden strips $\frac{3}{8}$ inch thick, 2 inches wide and about 18 inches long are bolted to a shelf so that they will project 6 or 8 inches, and high enough so that the Lifters will hang clear of the floor. For $\frac{1}{4}$ -inch lifters the wooden strips are placed about



Transom Lifters Suspended.

$\frac{3}{8}$ inch apart and for $\frac{3}{4}$ -inch Lifters about $\frac{1}{2}$ inch apart. The Lifters are hung between the wooden strips, with the bottom end up, each opening holding about a dozen Lifters.

Another Method.

THE F. Hallock Company of Derby, Conn., make no attempt to display Transom Lifters, but keep them in a counter as shown herewith. A portion of the



Transom Lifters in a Counter.

counter is cut away to show the front end of a series of shelves, and their arrangement. The shelves are long

enough to accommodate the Lifters. The door at the end of the counter is about 18 inches wide, and when closed forms a finished end to the counter. The Lifters are put on the shelves through the opening formed by the door, and when making sales the required sizes can be easily drawn out from the shelves. The company have found no way of keeping these goods in stock that is more satisfactory than this method.

CONTENTS.

	PAGE.
The Secor Internal Combustion Engines. Illustrated.....	1
Abram S. Hewitt on Trusts	4
Heavy Rolling Mill Engines.....	5
The Cook|Smoke Burning System.....	5
American Competition in the English Metal Market.....	6
American Steel Substituted for Imported Swedish.....	6
The Hartman Pig Iron Casting Machine. Illustrated.....	7
Iron and Steel in Scotland.....	8
Rolls for Splitting Old Steel Rails. Illustrated.....	9
Specifications for Foundry Materials.....	10
Central Pennsylvania News.....	13
A Large Gas Engine and Electric Power Plant. Illustrated.....	14
The Gruson Plant	16
The International Association for Testing Materials.....	17
Navy Yard Construction Plants.....	21
Lake Iron Ore Matters	23
Canadian News.....	24
The Allis-Andrew Sheet Rolling Process.....	25
Personal	26
Editorials :	
Standard Specifications.....	26
Pure Physics and Applied Science.....	26
An Abuse of Courtesy.....	27
Liability for Damages Through Smoke.....	27
Trials of H. M. S. "Viper".....	27
Pacific Coast News.....	28
The Bureau of Ordnance.....	29
The St. Lawrence Power Company.....	29
Manufacturing :	
Iron and Steel.....	30
Machinery.....	30
Hardware.....	31
Miscellaneous	31
A New Sheet Mill	31
The Iron and Metal Trades :	
A Comparison of Prices.....	32
Chicago.....	32
Philadelphia.....	34
Cleveland.....	34
Cincinnati.....	35
Birmingham.....	35
Pittsburgh.....	36
St. Louis.....	37
The British Iron Market.....	37
New York.....	38
Metal Market.....	38
Obituary.....	38
Iron and Industrial Stocks.....	39
The Chicago Machinery Market.....	40
The New York Machinery Market.....	40
Trade Publications.....	41
Hardware :	
Combinations and Competition.....	43
The Effect of Prices on Sales	43
Tone of the Hardware Market.....	43
Volume of Business.....	43
Special Reports.....	43
Notes on Prices.....	45
David Kelley. Portrait.....	47
Exports to England.....	48
Hardware Exhibits at Paris. Illustrated.....	48
From a British Correspondent	49
Cultivating Holiday Trade.....	50
Letters from the Trade.....	50
Laughlin Nail Company.....	51
County Fair Window Display. Illustrated.....	51
A New Shovel Factory.....	51
Hardware Store Arrangement :	
Arrangement of Transom Lifters. Illustrated.....	52
Another Method. Illustrated.....	52
Maud's Gaudy Store.....	58
Price-Lists, Circulars, &c.....	58
Trade Items	58
Among the Hardware Trade.....	54
Miscellaneous Notes :	
The Chicago Solar Light Company.....	55
Plated Aluminum Novelties	55
Goodell Company.....	55
The Twentieth Century Sash Lock. Illustrated.....	55
The Mogul Switch and Frog Broom. Illustrated.....	55
Bench Punch. Illustrated.....	55
Herrick's Improved Screw Case No. 4. Illustrated.....	56
The Ladies' Friend Toaster and Broiler. Illustrated.....	56
Union Tool Grinder No. 3. Illustrated.....	56
Current Hardware Prices.....	57
Current Metal Prices.....	64

Maud's Gaudy Stove.

BY POETICUS.

MAUD MULLER on an autumn day,
With money earned by raking hay,

Started for town, to invest her pelf
In a modern stove that feeds itself.

Not an ancient styled one, of humble mien,
Devoid of luster and silver sheen,

But an up-to-date, veritable "work of art"
Was the kind on which she had set her heart.

So singing she rode toward the busy town,
Where candidates gather and the brew is brown,

And stove dealers ever lie in wait,
With nickel trimmings displayed for bait.

On reaching there she drove to the store
Of one who "taken her in" before.

He was mighty glad to see Maud that day,
As a bill was due that he had to pay.

When first she entered she could but stare
At the gilt and tinsel displayed there.

But the stove that took her eye was one
That seemed to fairly outshine the sun.

It stood upon an old gold base,
And had foot rails fashioned like old point lace.

It was chased and nicked and burnished o'er
Till it glittered and gleamed at every pore.

While on top a rooster in plumage gay
Crowed every morning at break of day.

A hand painted shaker of artistic design
Completed an outfit most truly sublime.

The dealer, with his selling throttle opened wide,
Explained to Maud Muller the entire inside.

How the grate protector protected the grate,
And the slate extractor extracted the slate

From the coal; and he showed her, too,
The mysteries of the revertible flue.

And how no dust could get on the floor
Through the gold leaf gauze in the ash pit door.

That stove ere long stood in Maud's home,
With neighbors admiring its gilded dome.

But time rolled on, as time will do,
And the stove assumed a different hue.

Its radiance paled and then grew dim,
Till its claims to beauty are mighty slim.

Maud's husband sits by it, and loudly snores,
While the children poke holes in the mica doors.

Yet oft, when the fire is burning low,
Maud watches a picture come and go.

Of all sad thoughts to her just then
Is the thought, "What a fool I must have been.

"For had I possessed the brains which I that day
lacked,

I would have bought a stove that could be blacked."

—The Metal Worker.

At the age of 81 Philo N. Kneeland, 264 Grand River avenue, Detroit, Mich., has retired from the Hardware and Stove business, after being identified with it for nearly 50 years. Mr. Kneeland disposed of his stock to Tucker Bros., 362 Grand River avenue.

Price-Lists, Circulars, &c.

MORLEY BROS., Saginaw, Mich.: The Morley Easy Rolling Shelf Ladder. A catalogue has just been issued relating to this Ladder system, which is made to fit all kinds of shelving and is especially suitable for retail stores. It presents a number of *fac-simile* testimonials from well-known houses who have the Ladders in use.

ACORN BRASS WORKS, 19-23 South Jefferson street, Chicago, Ill.: Catalogue illustrating and describing their line of Acorn Gasoline Gas Lamps.

CRANE BROS., Westfield, Mass.: Price-list of Linenoid Seamless goods, including Boats and Canoes, Yacht Launch, Touring Case, Sportsmen's Carry-All, Megaphones, Baths, Trunks, Developing Trays, &c.

JOHN H. GRAHAM & Co., 113 Chambers street, New York: A double sheet, gummed, to be inserted in their large catalogue. It relates to the Coffee Mills and Wire Rope Clamps manufactured by the Bronson-Walton Company, for whom they are agents. The Mills are illustrated in color, giving the exact appearance of the goods.

E. C. ATKINS & Co., Indianapolis, Ind.: "Atkins' Price Current," containing illustrations and net prices on their line of specialties for use in saw and planing mills, wood working factories, &c. Heretofore they have issued these prices in the form of a four-page circular, but they are now sent out in the shape of a pamphlet, which they think will be found more attractive and convenient. The booklet also contains list prices on circular and other Mill Saws, on which they will be pleased to quote discounts on application.

SIMMONS HARDWARE COMPANY, St. Louis, Mo.: Catalogue No. 383, relating to Guns, Rifles, Revolvers, Football Goods, Canvas Goods, Golf Goods, &c.; catalogue No. 385, devoted to Doll Carriages, Children's Chairs, Boys' Wagons, Velocipedes, Sleds, Skates, &c.

YPSILANTI MFG. COMPANY, Ypsilanti, Mich.: Folder No. 1, relating to Cast Iron Claw Hammers and Stove Pipe Dampers. They are also manufacturing Mrs. Potts' Sad Irons and other specialties.

P. & F. CORBIN, New Britain, Conn.: An elegant catalogue of 82 pages devoted to the Corbin Lock Sets.

L. A. SAYRE & Co., Newark, N. J.: Catalogue and price-list of nearly 100 pages, relating to their varied line of Hardware Specialties and Mechanics' Tools.

THE HEATH-QUIMBY COMPANY, Minneapolis, Minn.: Circular descriptive of the Blizzard Bicycle Pump, Instantaneous Pump Connection and the Acme Storm and Screen Sash Hangers.

Trade Items.

J. C. McCARTY & Co., 10 Warren street, New York, have recently been constituted selling agents for the H. C. Tack Company, Cleveland, Ohio. This company manufacture a complete line of Cut Tacks, Clout, Finishing and Shoe Finders' Nails, Double Pointed Tacks, &c. They make a specialty of package assortments, of which they have about 12 in all, seven of them being new to the trade. The assortments contain their most salable sizes of Carpet Tacks—namely, 6, 8 and 10 ounce in gross and half gross cases. The individual packages contain either 250 or 500 count. One of the features of the new assortments is the packing of prizes in the cases, one of which is a gentleman's stem winding watch, another a lady's watch, while a third contains a Nail Puller, each assortment containing 1 gross packages having one of the three articles mentioned.

KOKOMO WIRE & NAIL COMPANY, Kokomo, Ind., expect to have their plant in operation by December 1, manufacturing Plain and Galvanized Fencing Wire, Barb Wire, Market Wire, Wire Nails, Staples, Farm Fencing, &c. Macgowan & Finnigan, Laclede Building, St. Louis, Mo., will represent the company in that territory.

THE trade will observe among the Special Notices in this issue one signed "Shovels," in which the advertisers announce their desire to negotiate with manufacturers who are willing to consider the matter of engaging in the making of Shovels, Spades, Scoops, &c. The firm refer to their existing business in the line as exceeding \$100,000 per annum. From the position of the firm in the trade and their facilities for marketing goods this would seem to be an opportunity deserving the consideration of manufacturers.

E. C. SIMMONS, advisory director of Simmons Hardware Company, St. Louis, returned from abroad on the "Oceanic" last week, after a brief trip to British and Continental points.

Among the Hardware Trade.

R. V. Sutherland has sold out his stock of Hardware, Stoves, &c., at Sheldon, Iowa, to W. V. Andrews, who continues at the old stand.

Joseph B. Hutchins has purchased his father's Hardware business at New Haven, Ky.

Baker & Redman have dissolved partnership in the Hardware and Furniture business in Belleville, Ark., and M. B. Redman is successor under his own name.

Dan. H. Mudd, Edina, Mo., has been succeeded by Mudd & Gibbons, who have added Lumber to their former stock of Hardware, Stoves, &c.

F. V. Moore has succeeded E. N. Cooper, Perry, N. Y., dealer in Hardware, Stoves, Farming Implements, Sporting Goods, &c.

Stone & Calvert are successors to Stone & Hulen, at Chickasha, I. T. The new firm have made a number of changes in the store and have doubled their shelf capacity. The store as altered is referred to as presenting an up-to-date appearance.

Evenson Bros., Tomahawk, Wis., have purchased the Hardware business of Doyle & McGonigal at Minocqua. In order to avoid confusion they are running the branch under the style of the Minocqua Hardware Company. Their line embraces general Hardware, Bar Iron, Wagons, Buggies, Farming Implements, Harness, Lime, Cement, &c.

J. S. Woodward & Co. have disposed of their Hardware, Stove and Farm Implement business in Lockport, N. Y., to F. D. Morris Company.

Hansen & Son have succeeded Hanson & Hawkins in the Hardware and Stove business in Vermillion, S. D.

Jenson & Fredrickson have dissolved partnership in the Hardware, Stove and House Furnishing Goods business at Long Island City, N. Y., and C. Jenson is now carrying on the store under his own name.

F. W. Carruthers, Jr., has sold out his business at Milford, Texas, to Jones Hardware Company, who will continue at the old stand.

M. H. Scandrett has succeeded Boyle & Sons, Hardware and Stove dealers, Liberal, Kan.

Elias V. Cady has purchased the Hardware, plumbing and heating business of Robert W. Smith, Cohoes, N. Y.

A. L. Cochran, retailer of Stoves, Hardware, Farming Implements, Sporting Goods, &c., Roff, I. T., has sold out to Burl Heathman.

George Robertson has lately opened a new store in Riverside, Cal., carrying Stoves, Tinware, Shelf Hardware and House Furnishing Goods.

Bailer & Bryant are successors to Bailer & Newman, Hardware and Agricultural Implement merchants, Clinton, Ill.

A. B. Beisell & Co. have purchased the general Hardware and furniture business formerly conducted by E. F. McElhinney, Goldfield, Iowa.

A. P. Weaver Company have bought the stock of Charles O. Hartsook, Pleasanton, Iowa, and have removed the goods to their own establishment.

L. B. Gardner has purchased the Hardware business of Carl Merckel, Charles City, Iowa. Mr. Gardner has associated with him F. G. Prime, who formerly traveled in Iowa for Hibbard, Spencer, Bartlett & Co. and Farwell, Ozmun, Kirk & Co., and also for eight years in Minnesota representing Adam Decker & Co. of St. Paul. Mr. Gardner was formerly for a number of years the senior partner of the firm of Gardner, Ure & Young, New Hampton, Iowa, so that both parties have had a good deal of practical experience in the Hardware business. The firm have made a number of radical improvements in the store which they have purchased with a view to increasing its attractiveness and convenience.

J. W. Gilbert, Hilliards, Ohio, has opened a new store and is carrying a line embracing Shelf and Heavy Hardware, Stoves and Tinware.

W. L. Altenburg, Wells, Minn., has taken possession of a new store which has been handsomely fitted up.

Williams & Boswell have succeeded J. B. Williams in the Hardware, Buggy, Wagon and general merchandise business in Greensboro, Ga. The capital of the firm is \$20,000. They wholesale as well as retail.

T. B. Curtis is successor to Curtis & Boyd in the Hardware, Stove and Tinware business in Woodburn, Iowa.

R. C. Buckley has purchased the Hardware business of J. A. Buckmaster, Bradshaw, Neb., and will continue at the old stand.

John Malmgren's Agricultural Implement store, at Cresco, Neb., was damaged by fire a short time since to the extent of \$3000.

S. B. Anderson has succeeded Edward A. Hulett in the Hardware, Stove, Agricultural Implement and Sporting Goods business at Armada, Mich.

Webb & Mutz have succeeded D. R. Webb, Edinburg, Ind., dealers in Shelf Hardware, Stoves and Tinware.

Lawrence & Hipskind have sold out their Hardware business in Wabash, Ind., to C. P. McConn.

Ball & Bollinger have bought the general Hardware and Farm Implement business at Delta, Iowa, formerly conducted by Sampson & Sampson.

C. Fortney, Pleasant Mills, Ind., dealer in Shelf Hardware, has been succeeded by C. Fortney & Son.

J. M. Carvin has purchased the Hardware and Stove business of Pruitt Bros., Edinburg, Ind.

R. W. Newton has succeeded under his own name to the Hardware, Stove and Tinware business formerly conducted by Jackson & Newton, at Kellerton, Iowa.

A. H. Nichols has moved his stock of Hardware, Stoves, &c., from Papillion to Louisville, Neb.

W. H. Muspratt-Williams, Sarvis, Ont., has disposed of his Hardware business to Pedlow & Co.

Fire in the establishment of D. Heim's Son, Sunbury, Pa., on the 12th inst., destroyed about \$8000 worth of goods. The loss was partially covered by insurance.

Hood & Clelland have purchased the Hardware, Stove, Agricultural Implement and Sporting Goods business of D. N. Snyder & Co., Fairmount, W. Va.

I. D. McKeever, C. H. McKeever, L. K. McKeever, Pearl McKeever and J. E. McKeever have incorporated the McKeever Hardware Company, Barnesville, Ohio, with a capital of \$25,000. The company are successors to I. D. & C. H. McKeever, dealers in Hardware, Agricultural Implements, Seeds, &c.

John P. Frazer has succeeded Charles F. Frazer in the Hardware, Stove and Agricultural Implement business in Victor, N. Y.

H. Schminck, Lakeview, Ore., has removed his Hardware and general merchandise stock to new quarters.

Clark Bros. & Burgher have purchased the Hardware, Farm Implement and Furniture business of Powers & Kincart in Moulton, Iowa.

Lincoln Buchanan has succeeded Smith & Buchanan in West Branch, Iowa, dealers in Hardware, Stoves, Sporting Goods, &c.

Jamison-Pierce Hardware Company, Lafayette, Ind., have been incorporated with a capital stock of \$3500.

The Hardware business at Gladwin, Mich., formerly conducted by Foster & Lewis is now being carried on by B. S. Lewis, under his own name.

B. L. Monck has sold his Hardware store in Snohomish, Wash., to J. L. Lysons. Mr. Lysons has removed the stock to new quarters, which have been attractively and conveniently fitted up.

Ward & Mann have sold out their Hardware business in Ollie, Iowa, to Starr & Richardson.

Hoopes Bros. Hardware Company have moved their business from Denver to Colorado Springs, Col., where they are now comfortably settled.

W. E. Hall Hardware Company, Port Arthur, Texas, have disposed of their stock of Shelf and Heavy Hardware to Stearns & Coleman of that city, who will combine it with their Farm Implement business.

E. F. Shockey has purchased the Hardware, Wagon, Buggy and Farm Implement business formerly conducted by W. L. Berry, Spickard, Mo.

Keystone Hardware Company have succeeded Hall, Barton & Co., Reynoldsville, Pa. The new firm will increase the stock thus acquired.

Ball & Bollinger have purchased the Hardware business formerly carried on by Sampson & Sampson in Delta, Iowa.

The Lewis-Rarden Hardware Company, Bessemer, Ala., have dissolved partnership in the wholesale and retail business. Lewis Hardware Company succeed at the old stand.

John McNulty & Sons are successors to Geo. D. Benn, at Coalport, Pa. A number of improvements have been made in the store, and the firm are now prepared to do all kinds of repairing.

W. J. Estep has sold out his stock of Hardware in Lawrence, Neb., to F. M. Harris.

Miscellaneous Notes.

The Chicago Solar Light Company,

manufacturers of the Nulite incandescent vapor gas lamps, 56 Fifth avenue, Chicago, are now turning out a full line of lamps of various styles to fill all requirements. The styles made by them comprise wall lamps, for hanging on the wall; table lamps which stand on ornamental pedestals; student lamps which resemble in appearance the well-known oil student lamp, pendants, with one light, attached to the hanger in bracket fashion, or inserted in the middle of an ornamental frame; plain and fancy two-light chandeliers, three-light chandeliers and four-light chandeliers; indoor and outdoor arc lamps to be used on posts. The burners used in these lamps are provided with an automatic cleaning device, and it is claimed that this obviates all danger of clogging. When the supply is turned off the light goes out instantly the same as a gas jet, with no flicker, smoke or noise. It may be regulated as easily as an incandescent gas burner to give either a small light or its full power. The company's lamps have been approved by the fire insurance underwriters. A neat catalogue has been issued by the company, fully describing their products.

Plated Aluminum Novelties.

The Norton Mfg. Company, Chester, Conn., have just fitted up a plant for the purpose of plating all kinds of aluminum goods in gold, silver, brass or gun metal finish, and have entered the market with a line of plated aluminum novelties. The company advise us that after a series of prolonged and elaborate experiments a process of plating has been patented and under these patents they will place upon the market a line of goods of which they will have exclusive control in the United States, and for which they expect to build up a large trade. The company will continue to make their former line of German and double cut bits, gimlets, ice picks, chisels, awls, &c.

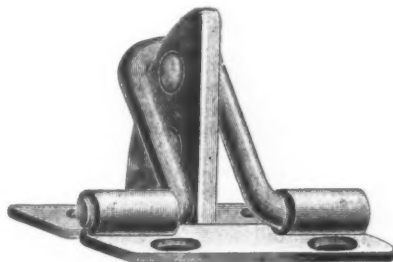
Goodell Company.

The Goodell Company, Antrim, N. H., are constantly adding to their line of cutlery, and their new catalogue recently issued shows a number of styles and shapes not heretofore illustrated by them. Particularly new is their "Four Hundred" line of knives and forks. In these knives and forks there is a solid connection between blade, tang, bolster and handle, which cannot be loosened, nor do the handles split or crack, this being accomplished by a patented process of manufacture.

The Twentieth Century Sash Lock.

F. L. Ellis & Son, Milldale, Conn., are putting on the market the Twentieth Century sash lock, shown in the accompanying illustration. The lock is made of sheet metal, one part of which is an upright piece, the shape of a quarter circle, over which a movable loop attached to the other part slips. By pushing this loop down over the circular edge of the upright piece the sashes are drawn together tightly and securely locked. It is stated

that it is impossible to slip the lock from the outside by means of a thin bladed knife or by other means, but that a slight pressure of the finger will unlock from the inside. The security and neat appearance of the lock are pointed out by the manufacturers, also that being

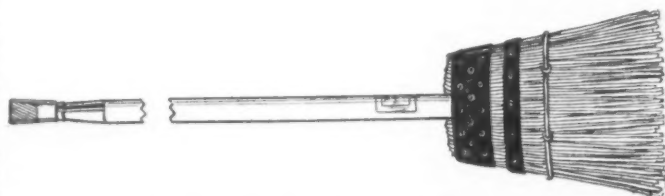


The Twentieth Century Sash Lock.

made of sheet metal it can be made cheaply, and will take a high polish. The lock is furnished in nickel, bronze or silver finish.

The Mogul Switch and Frog Broom.

The combination broom and chisel for removing ice and snow from frogs and switches on both steam and street railways, which is herewith illustrated, is put on the market by the Osborn Mfg. Company, Cleveland, Ohio. The broom proper is made of rattan, the fibers being of double length, and bent over a steel retaining rod, and so securely held, it is explained, that the diffi-

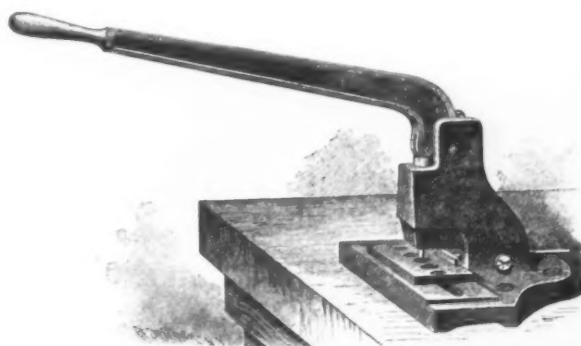


The Mogul Switch and Frog Broom.

culty of the fibers backing up after short use is obviated. The steel retaining rod, over which the fibers are bent, is passed through the handle and so made perfectly secure. The manufacturers guarantee that the handle will not become loosened. The chisel is made of wrought steel. The broom is furnished either with or without the chisel attachment. The company state that they will send samples to railways requesting them to do so.

Bench Punch.

Charles Morrill, Broadway Chambers, New York, is manufacturing the bench punch here illustrated. It is fitted with interchangeable dies and plungers, varying in size from $\frac{1}{8}$ to $\frac{3}{4}$ inch in diameter, the regular equipment being $\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$ inch punches; although any size to $\frac{3}{8}$ inch inclusive can be made. The tool is made of

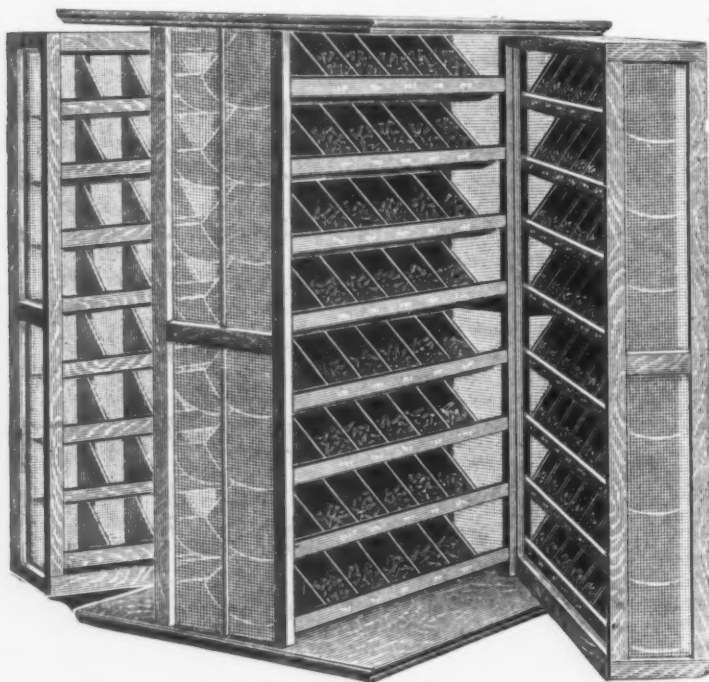


Bench Punch for Metals, &c.

iron and steel, and is designed for punching sheet metals. There is a gauge secured by a set screw on the right which permits of a space of $\frac{1}{2}$ inch between the edge and punched hole. The device can be screwed or bolted to bench or table, and has a lever 21 inches long. Aside from punching sheet metals it is recommended by the manufacturers for punching cardboard, veneering, paper, celluloid or any fibrous material not over $\frac{1}{2}$ inch thick.

Herrick's Improved Screw Case No. 4.

The screw case herewith shown is put on the market by F. A. Herrick Company, Jackson, Mich. The wood work is of oak inclosed with galvanized wire cloth. The illustration shows the case partially open, exposing the bins, of which there are 224 in the four sections. Two gross of each size of screws up to 1½-inch, it is remarked, can be put into each bin. The bins are made of tin with the bottoms rounded, so that the screws can be easily taken out. Cardboard strips are attached to the front of the bins, and are left blank so that dealers can mark the sizes carried in stock. The swinging sections of the case slide on iron shoes attached to the bottom of the stationary part, and operate easily, it is explained. The case provides accommodations for a well assorted stock of flat head bright and brass screws, round head blued, brass and nickel plated screws. The case occupies 23 x 28 inches of counter room, and is 39 inches high. The manufacturers claim that the case holds a large assortment of screws, that the bins can be marked to suit the sizes and kinds carried in stock, that in a second's time the salesman can have the full line of screws before him,

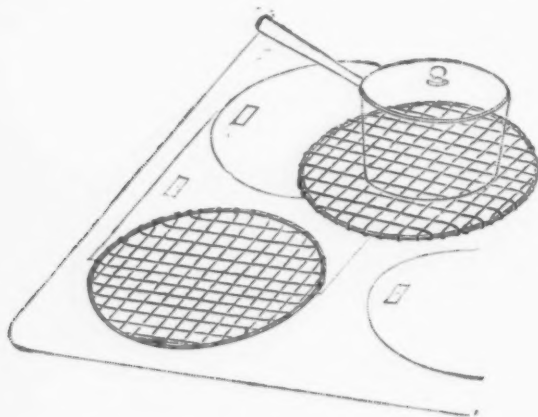


Herrick's Improved Screw Case No. 4.

and that the bins can be kept clean by blowing the dust out through the wire cloth with hand bellows. The case weighs 140 pounds, packed ready to ship.

The Ladies' Friend Toaster and Broiler.

The accompanying cut represents a combination toaster and broiler offered by the Killbourn Mfg. Com-



The Ladies' Friend Toaster and Broiler.

pany, Fair Haven, Vt. The device is made of a heavy wire ring covered with heavy woven wires retinned, and is made in 8 and 9 inch sizes, so constructed that when

the lid of a stove is removed the ring will rest on the flange and may be used for heating, broiling or toasting. In this position it can be advantageously used when the fire is low. By reversing and placing it with the ring down on the top of the stove, an air space is left between the stove and the woven wires. In this way it may be used in place of an asbestos mat, placing on it the cooking utensil containing anything to be cooked that is in danger of burning. It is explained that the air space between the kettle and the stove obviates the danger of food burning.

Union Tool Grinder No. 3.

The Union Mfg. Company, Buffalo, N. Y., have added to their line of grinders the one shown herewith. The machine is constructed, the manufacturers state, upon an entirely different principle from their Nos. 1 and 2 grinders. It is provided with two wheels, two treads,



Union Tool Grinder No. 3.

and a heavy balance wheel. The power is attained through the medium of the heavy balance wheel, driven by the company's speed motor, connected on each side of the column, giving the drive wheel a revolution of three to one of the tread. The movement of the tread is referred to as being a walking motion, easy to operate. The makers remark that the head is finely fitted, and that it has adjustments for all wear. The steel shaft is 5/8 inch in diameter, and is designed to carry wheels from 1/2 to 1 x 7 inches in diameter. The spindle has both ends fitted with collars and nuts, with self-oiling bearings; the table is of iron with grooved edge, 9 1/4 x 10 1/2; the column is a solid casting, fastened to a base 7 1/2 x 11 inches in size. The manufacturers recommend the machine to those having a great deal of grinding, and it is pointed out that it is practical to grind from a crow bar to the finest tool with slightly more effort than with a power machine; it may also be driven by power. For skate grinding and any work requiring a smooth, steady motion, the makers explain that the machine will be found a satisfactory tool; also that it is well adapted for polishing and buffing. The grinder is furnished with one emery wheel 6 x 3 1/4 inch. The weight of the machine complete is 90 pounds, and it stands 40 inches high.

Stover Mfg. Company, Freeport, Ill., have received a letter from one of their agents in which gratifying reference is made to the strength of their Ideal wind mills. The letter describes two severe storms, one of them a cyclone, which visited Wisconsin during the past summer, causing much general destruction, but not damaging in the least the wind mills made by the company.

Carpet Stretchers—

See Stretchers, Carpet.

Cartridges—

B. B. Caps, Con., Ball Swgd.	\$.130
B. B. Caps, Round Ball.	\$.112 @ 1.18
Blank Cartridges:	
32 C. F.	\$.50
32 C. F.	\$.70
32 cal. Rim.	\$.150
32 cal. Rim.	\$.25
Central Fire	2%
Pistol and Rifle	15%
Primed Snells and Bullets	15%
Rim Fire Sporting	50%
Rim Fire Military	15%

Casters—

Bed	70 @ 70¢ 10%
Plate	75 @ 75¢ 10%
Philadelphia	75 @ 75¢ 10%
Boss	70 @ 10%
Boss Anti-Friction	70 @ 10%
Martin's Patent (Phoenix)	45%
Payson's Anti-Friction Furniture	70 @ 10%
Payson's Anti-Friction Truck	70 @ 10%
Standard Hall Bearing	40%
Tucker's Patent, low list	30%

Cattle Leaders—

See Leaders, Cattle.

Chain—

American Coll. Flat Casks:	
3 1/2 5 5-16 3/4 7-16 1/2 9-16	
7 5/8 3 3/4 3 5/8 3 5/8 3 5/8 3 5/8	
3 1/2 3/4 3/4 to 1 1/4 inch.	
3 1/2 3/4 3 00 cents per lb.	
Less than Cask lots add 40¢ per 10 lbs.	
German Coll. Flat July 24, '97. 60¢ @ 10¢ 10%	
German Halter Chain, list July 24, '97.	
Traces, Western Standard: 100 pair	
6 1/2-8-3, Straight, with ring.	\$26.00
6 1/2-8-2, Straight, with ring.	\$27.00
6 1/2-8-2, Straight, with ring.	\$31.00
6 1/2-10-2, Straight, with ring.	\$35.00
Add 2¢ per pair for Hooks.	
Twist Traces 2¢ per pair higher than	
Straight Link.	

Trace, Wagon and Fancy Chains,	
list April, '98.	50¢ @ 10¢ 60%
Jack Chain, list July 10, '98:	
Iron	60¢ @ 10¢ 10%
Brass	60¢ @ 10¢ 10%
Safety Chain	60¢ @ 10¢ 10%
Gal. Pump Chain	10 50¢ @ 10%
Covert Snd. Works	50%
Breast, Hitching and Rein Chains.	50%
Covert Mfg. Co.:	
Breast	35¢ @ 25%
Halter	35¢ @ 25%
Heel	35¢ @ 25%
Rein	35¢ @ 25%
Stallion	35¢ @ 25%

Onesida Community:	
Eureka Coll and Halter	60¢ @ 10¢ 5%
Niagara Coll and Halter	60¢ @ 10¢ 5%
Niagara Cow Ties	45¢ @ 10¢ 5%
Am. Coll and Halters	50¢ @ 10¢ 5%
Am. Cow Ties	35¢ @ 10¢ 5%
Wire Goods Co.:	
Dog Chain	60%
Universal Dbl-Jointed Chain	45%

Chalk—(From Jobbers.)

Carpenters', Blue	gro. 45¢
Carpenters', Red	gro. 40¢
Carpenters', White	gro. 35¢

Chalk Lines—See Lines.**Checks, Door—**

Bardsley's	40¢ @ 10%
Columbia	50¢ @ 10%
Eclipse	60¢ @ 10%

Chests, Tool—

American Tool Chest Co.:	
Boys' Chests, with Tools	55%
Youths' Chests, with Tools	40%
Gentlemen's Chests, with Tools	30%
Farmers', Carpenters', etc., Chests,	
with Tools	30%
Mechanists' and Pipe Fitters' Chests,	
Empty	50%
C. E. Jennings & Co.'s Mechanists' Tool	
Chests	25¢ @ 25¢ 10%

Chisels—

Socket Framing and Firmer	
Standard List	70¢ @ 10¢ 10%
Buck Bros.	30%
Charles Buck	30%
C. E. Jennings & Co. Socket Firmer	
No. 10	60¢ @ 10%
C. E. Jennings & Co. Socket Framing	
No. 15	60¢ @ 10%
Swan's	70¢ @ 10%
L. & L. J. White	30¢ @ 30¢ 5%

Tanged—

Tanged Firmers	40¢ @ 10¢ 10%
Buck Bros.	30%
Charles Buck	30%
C. E. Jennings & Co. Nos. 191, 181.	25%
L. & L. J. White, Tanged	25¢ @ 5%

Cold—

Cold Chisels, good quality, lb. 1¢ @ 10¢	
Cold Chisels, fair quality	1¢ @ 10¢
Cold Chisels, ordinary	1¢ @ 10¢

Chucks—

Beach Pat. each \$8.00	20%
Skinner Patent Chucks:	
Combination Lathe Chucks	40%
Drill Chucks, Patent and Standard	30%
Drill Chucks, New Model	2%
Independent Lathe Chucks	40%
Improved Plane Chucks	20%
Universal Lathe Chucks	40%
Face Plate Jaws	35%
Standard Tool Co.:	
Improved Drill Chuck	45%
Union Mfg. Co.:	
Combination	40%
Clear Drill	30%
Geared Scroll	30%
Independent	40%
Union Drill	30%
Universal	40%
Face Plate Jaws	30%

Clamps—

Adjustable, Steamers'	20¢ @ 20¢ 5%
Adjustable, Steamers'	30%
Cabinet, Sargent's	45¢ @ 10%
Carriage Makers', P. S. & W. Co.	40¢ @ 10%
Carriage Makers' Sargent's	50¢ @ 10%
Bevis, Parallel	35¢ @ 10%
Lineman's, Ulica Drop Forge & Tool	40%
Saw Clamps, see Pliers, Saw Pliers	

Cleaners Walk—

Star Socket, All Steel	dos. \$4.00 net
Star Shank, All Steel	dos. \$3.75 net
W. & C. Shank, All Steel, 7 1/2 in. d. doz.	\$3.35; 8 in., \$3.40; 8 1/2 in., \$3.50.

Cleavers, Butchers'—

Foster Bros.	80%
New Haven Edge Tool Co.	40¢ @ 10%
Nichols Bros., Flat hdl., 30¢; Rd. hdl., 40¢	
Fayette B. Plumb	35¢ @ 35¢ 10%
P. S. & W.	35¢ @ 35¢ 10%
L. & J. J. White	25%

Clippers—

Chicago Flexible Shaft Company	
Hanly Toilet	dos. \$7.30
Mascotte Toilet	dos. \$3.40
Monitor Toilet	dos. \$8.00
Stewart's Patent	dos. \$10.00

Clips, Axle—

Eagle and Superior 1/4 and 5-16	
inch.	70¢ @ 10%
Norway, 3/4 and 5-16 inch.	70¢ @ 10%

Cloth and Netting, Wire

—See Wire, &c.

Cocks, Brass—

Hardware list (Globe, Kerosene,	
Lever Bibbs, Racking, &c.)	70¢ @ 70¢ 10%

Coffee Mills—See Mills, Coffee.**Collars Dog—**

Brass, Pope & Stevens' list	40%
Embossed, Gilt, Pope & Stevens' list	30¢ @ 10%
Leather Pope & Stevens' list	40%

Compasses, Dividers, &c.

Ordinary Goods	70¢ @ 10% 75%
Bemis & Call Hdw. & Tool Co.:	
Dividers	65%
Calipers, Call's Patent Inside	55%
Calipers, Double	55%
Calipers, Inside or Outside	45%
Calipers, Wing	80%
Compasses	50%
J. Stevens & A. T. Co.	25¢ @ 10%

Conductor Pipe, Galva-

nized—	
Carload	L. C. L.
Territory	Loose
Eastern	60¢ @ 25¢ 5%
Central	60¢ @ 25¢ 5%
Southern	60¢ @ 25¢ 5%
S. Western	60¢ @ 25¢ 5%
Terms, 2% for cash.	
See also Eave Trough.	

Coolers, Water—

Nos.	3 4 5 6 8
Labrador \$11.50 \$14.00 \$17.50 \$20.00	
8 gal.	
24.00	
Nos.	3 4 6 8
Iceland	\$23.00 \$25.00 \$30.00 \$37.50
10 14 gal.	
\$57.00 \$72.00	

Coopers' Tools—

See Tools, Coopers'.

Cord—Sash—

Braided, Drab	lb. 25¢
Braided, White, Common, lb 17 1/2 @ 18¢	
Cable Laid Italian, lb. A, 18¢; B, 16¢	
Common India	lb. 8¢ @ 9 1/2¢
Cotton Sash Cord, Twisted	12¢ @ 10¢
Patent Russia	lb. 12¢
Cable Laid Russia	lb. 13 1/2¢ @ 14¢
India Hemp, Braided	lb. 11¢ @ 12¢
India Hemp	lb. 10¢ @ 12¢
Patent India	lb. 10¢ @ 12¢
Pearl Braided, cotton	lb. 16¢ @ 18¢
Massachusetts, White	lb. 24¢ @ 26¢
Edgerton Braided Cotton	lb. 19¢
Harmony Cable Laid Italian	lb. 18¢
Ossawa Mills:	
Crown, Solid Braided White	lb. 18¢
Braided, Giant, White	lb. 17¢
Peelers:	
Cable Laid Italian	16¢
Cable Laid Russian	14¢
Cable Laid India	14¢
Braided India	18¢
Phoenix, White	16¢
Samson:	
Braided, Drab Cotton	lb. 32¢ @ 34¢
Braided, Italian Hemp	lb. 32¢ @ 34¢
Braided, Linen	lb. 40¢
Braided, White Cotton, Spot	lb. 28¢ @ 30¢
Silver Lake:	
A quality, Drab, 40¢	15%
A quality, White, 55¢	15%
B quality, Drab, 35¢	15%
B quality, White, 30¢	15%
Italian Hemp, 40¢	15%
Linen, 57 1/2¢	15%

Wire, Picture—

Braided or Twisted.

See Trade Report.

Corn Knives and Cutters

—See Knives, Corn.

Corn Planters—

See Planters, Corn.

Crackers, Nut—

Little Giant	dos. \$7.25
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Cradles—

Grain

Crayons—

White Round Crayons, gross 5% @ 5¢	
Cases, 100 gro., \$5.00, at factory.	
D. M. Stewart Mfg. Co.	
Metal Workers' Crayons, gr. \$2.50	
Snapstone Pencils, round, flat	
or square	\$1.50
Rolling mill Crayons	gr. \$2.50
Railroad Crayons (compo-	
sition) gr. \$3.00	

See also Chalk.

Creamery Pails—See Pails,

Creamery.

Crooks, Shepherds'—

Fort Madison, Heavy	dos. \$7.00
Fort Madison, Light	dos. \$6.50

Crow Bars—See Bars, Crow.**Cultivators—**

Victor Garden	dos. \$10.00
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Cutters—Glass—

Smith & Reinway Co.	30%
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Meat—

American

Nos.

1 2 3 4 5 6

Each

\$5 \$7 \$10 \$35 \$50 \$60

Connecticut

Nos.

0 1 8 10 12

Each

\$1.75 2.25 3.00 3.00 3.50

Enterprise	100 @ 25¢ 7 1/2%
Nos.	5 10 12 22 32
Each	\$3 \$3 \$2.50 \$4 \$6
Dixon's	dos. \$3.50 @ 10%
Nos.	1 2 4
Each	\$14.00 \$17.00 \$19.00 \$30.00
Nos.	11 12 13
Home No. 1	\$27.00 \$33.00 \$45.00
Little Giant	dos. \$28.00 \$35.00 \$50.00
Nos.	305 310 312 320 322
Each	\$35.00 \$48.00 \$44.00 \$72.00 \$68.00
Sterling	dos. \$35.00 @ 10%
Nos.	1 2
Each	\$2.00 \$2.50
Miles' Challenge	dos. \$45.00 @ 10%
Nos.	1 2 3
Each	\$22.00 \$30.00 \$40.00
New Triumph No. 605	dos. \$24.00 @ 10%
Woodruff's	dos. \$39.00 @ 10%
Nos.	100 150
Each	\$15.00 \$18.00
Chadborn's Smoked Beef Cutter	dos. \$60.00
Enterprise Beef Shavers	25¢ @ 30%

Saw and Kraut—

Henry Diaton & Sons:	
Saw, Corn Grater, &c.	40%
Kraut Cutters 24 x 7, 26 x 8, 30 x 9, 55	
Kraut Cutters 34 x 12, 40 x 12	40%
Tucker & Dorsey Mfg. Co.:	
Kraut Cutters	40%
Saw Cutters, 1 Knife, 8 gr.	\$1.50 @ 10%
Saw Cutters, 2 Knife, 8 gr.	\$2.25 @ 10%

Tobacco—

All Iron, Cheap	dos. \$4.25 @ 10%
Enterprise	25¢ @ 30%
National	dos. \$21.00 @ 10%
Sargent's	dos. \$24.00 @ 10%

Washer—

Appleton's	dos. \$16.00 @ 10%
Bonney's	dos. \$4.75 @ 10%

Diggers, Post Hole, &c.—

Dalby Post Hole Auger, per doz.	\$10.00
Iwan's Improved Post Hole Auger	40%
Iwan's Perfection Post Hole Digger	40%

Kohler's Universal—

Kohler's Universal	dos. \$14.00
Kohler's Little Giant	dos. \$15.00
Kohler's Hercules	dos. \$12.00
Kohler's Invincible	dos. \$10.00
Kohler's Rival	dos. \$9.00
Never-Break Post Hole Digger	dos. \$9.00
Samson	dos. \$34.00 @ 10%

Dividers—See Compasses.**Dog Collars—See Collars, Dog.****Door Checks—**

See Checks, Door.

Door Springs—

See Springs, Door.

Drawers, Money—

Tucker's Pat. Alarm Till No. 1	dos. \$18.00
No. 2, \$15 No. 3, \$14; No. 4, \$18.	

Drawing Knives—

See Knives, Drawing.

Drills and Drill Stocks—

Common Blacksmiths' Drill	each \$1.75 @ 22¢
Blacksmiths' Self-feeding	each \$3.75 @ 40¢

Bench Drills, Stearns'—

Bench Drills, Stearns'	50%
Bureau Millers Falls, each \$3.00	15¢ @ 10%
Brest, P. S. & W.	30¢ @ 30¢ 10%
Goodell Automatic Drills	40¢ @ 40¢ 10%
Johnson's Automatic Drills Nos. 2 and 3	10¢ @ 10%
Johnson's Drill Points	25¢ @ 10%
Ratchet, Curtis & Curtis	25%
Ratchet, Parker's	30¢ @ 25%
Ratchet, Weston's	30¢ @ 25%
Ratchet, Whitney's, P. S. & W.	40¢ @ 10%
Whitney's Hand Drill, No. 1	\$10.00
Adjustable, No. 10, \$12.00	33¢ @ 10%

Twist Drills—

Standard List	60¢ @ 60¢ 10%
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Cimlets—

Nail, Metal, Assorted, gro. \$1.40 @ 1.75
 Spike, Metal, Assorted, gro. \$3.00 @ 3.50
 Nail, Wood Handled, Assorted, gro. \$6.00 @ 6.25
 Spike, Wood Handled, Assorted, gro. \$5.00 @ 5.25

Class, American Window

Jobbers' List, Sept. 1, 1900
 Small lots from store:
 Single strength, all sizes, 85¢ @ 95¢
 Double strength, all sizes, 85¢ @ 95¢
 10% to be added on all first quality,
 both single and double.

Glue—Liquid, Fish—

List A, Bottles or Cans, with Brush, 37¢ @ 50¢
 List B, Cans (½ pts., pts., gals.), 35¢ @ 48¢
 List C, Cans (½ gal., gal.), 25¢ @ 45¢

Glue Pots—See Pots, Glue.**Crease, Axle—**

Common Grade, gro. \$5.00 @ 6.00
 Dixon's Everlasting, 10-m. pairs, ea. 85¢
 Dixon's Everlasting, in bxs., 1 doz. 1 m. \$1.20; 2 m. \$2.00
 Snow Flake:
 1 qt. cans, per doz. \$2.00; 2 qt. \$3.20;
 1 gal. cans, per doz. \$6.00; 3 gal. \$10.00; 5 gal. \$24.00

Grindstone Fixtures—

See Fixtures, Grindstone.

Guards, Snow—

Cleveland Wire Spring Co.:
 Galv. Steel ½ 1000, \$9.00
 Copper ½ 1000, \$18.00

Cun Powder—See Powder.**Hack saws—See Saws.****Hafts, Awl—**

Pat. Patent, Leather Top, \$4.90 @ 5.25
 Pat. Patent, Plain Top, \$3.50 @ 3.75
 Sewing, Brass Ferrule, \$1.50 @ 1.60
 Saddlers', Brass Ferrule, \$1.35 @ 1.45
 Pat. Common, \$1.25 @ 1.35
 Brad, Common, \$1.50 @ 1.75

Halters and Ties—

Covert Mfg. Co., Web, 45¢ @ 25¢
 Covert Mfg. Co., Jute Rope, 45¢ @ 25¢
 Covert Mfg. Co., Sisal Rope, 30¢ @ 25¢
 Covert's Saddlery Works, 96 list, W-b., 60¢ @ 10¢
 Covert's Saddlery Works, Leather 60¢ @ 10¢
 Covert's Saddlery Works, Jute, 60¢ @ 5¢
 Covert's Saddlery Works, Sisal, 60¢ @ 5¢
 Covert's Saddlery Works, Manila, 60¢ @ 5¢
 Covert's Saddlery Works, Cotton, 70¢ @ 5¢

Hammers—

Handled Hammers—
 Heller's Machinists', 50¢ @ 50¢
 Heller's Farriers', 50¢ @ 50¢
 Magnet Tack, Nos. 1, 2, 3, \$1.25 @ 1.50
 \$1.75 @ 1.50
 Peck, Stow & Wilcox, 40¢ @ 40¢
 Fayette R. Plumb:
 Plumb, A. E. Nail, 40¢ @ 40¢
 Engineers' and B. S. Hand, 40¢ @ 40¢
 Machinists' Hammers, 60¢ @ 75¢
 Riveting and Tinner's, 50¢ @ 50¢
 Sargent's C. S. New List, 40¢ @ 40¢

Heavy Hammers and Sledges—

5 lb. and under, lb. 45¢
 5 to 10 lb., lb. 50¢ @ 80¢
 Over 10 lb., lb. 80¢ @ 100¢
 Wilkinson's Smith's, 95¢ @ 100¢ lb.

Handcuffs and Leg Irons

See Police Goods.

Handles—

Agricultural Tool Handles—
 Hoe Rake, Fork, etc., 60¢ @ 60¢
 Shovel, etc., Wood D Handle, 50¢ @ 50¢

Cross-Cut Saw Handles—

Atkins', 40¢ @ 50¢
 Champion, 45¢ @ 45¢
 Diston's, 50¢ @ 50¢

Mechanics' Tool Handles—

Auger, assorted, gro. \$1.40 @ 1.75
 Auger, large, gro. \$2.50 @ 3.00
 Brad Awl, assorted, gro. \$1.50 @ 1.75

Chisel Handles:

Apple Tanged Firmer, gro. ass'd, \$2.25 @ 3.35; large, \$2.50 @ 3.60
 Hickory Tanged Firmer, gro. ass'd, \$1.75 @ 2.25; large, \$2.35 @ 2.50
 Apple Socket Firmer, gro. ass'd, \$1.75 @ 2.00; large, \$2.00 @ 2.25
 Hickory Socket Firmer, gro. ass'd, \$1.60 @ 1.75; large, \$1.75 @ 2.00
 Hickory Socket Framing, gro. ass'd, \$2.50 @ 2.75; large, \$2.65 @ 2.85
 File, assorted, gro. \$1.00 @ 1.15
 Hammer, Hatchet, Axe, etc., 60¢
 Hand Saw, Varnished, doz. 75¢ @ 80¢
 Not Varnished, 75¢ @ 80¢
 Plane Handles:
 Jack, doz. 25¢ @ 25¢; Jack Bolted, 55¢ @ 60¢
 Fore, doz. 35¢ @ 38¢; Fore, Bolted, 70¢ @ 75¢

Hangers—

Barn Door, New Pattern, Round Groove, Regular:

Inch..... 3 4 5 6 8
 Doz..... \$1.10 1.45 1.80 2.10 2.75

Barn Door, New England Pattern, Check Back, Round Groove, Regular:

Inch..... 3 4 5 6
 Doz..... \$1.60 2.00 2.40 3.25

Chicago Spring Butt Co.:

Friction..... 25¢
 Oscillating..... 25¢

Big Twin..... 25¢

Chisholm & Moore Mfg. Co.:

Baggage Car Door..... 50¢
 Elevator..... 40¢

Railroad..... 55¢

Coleman Hardware Mfg. Co.:

Car Ball Bearing, ½ doz. pair \$7.50

No. 10 Roller Bearing, doz. pr. 5.50

No. 20 Roller Bearing, doz. pr. 4.50

Nickel..... 50¢

J. G. C..... 50¢ @ 10¢

Cronk Hanger Co.:

Roll-r Bearing..... 60¢ @ 10¢

Lane Bros.:

Parlor, Standard..... \$3.25

Parlor, New Model..... \$3.75

Barn Door, Standard..... \$3.75

Covered..... 50¢ @ 10¢ @ 5¢

Special..... 60¢ @ 10¢

Lawrence Bros.:

Advance..... 60¢

Cleveland..... 60¢ @ 10¢

Crown..... 60¢

New York..... 60¢

Pe-ri-ess..... 60¢ @ 10¢

Sterling..... 60¢

McKinney Mfg. Co.:

No. 2, Standard, \$18..... 60¢ @ 10¢

No. 1, Special, \$13..... 60¢ @ 10¢

Stowell Mfg. and Foundry Co.:

Badger..... 60¢

Baggage Car Door..... 33¢ @ 45¢

Climax Anti-Friction..... 50¢

Elevator..... 40¢

Interstate..... 50¢ @ 10¢

Matchless..... 50¢

Nansen..... 50¢ @ 10¢

Parlor Door..... 50¢

Railroad..... 50¢ @ 10¢

Street Car Door..... 50¢ @ 10¢

Steel, Nos. 300, 400, 500..... 40¢ @ 10¢

Wild West..... 50¢ @ 5¢

Zenith for Wood Track..... 50¢ @ 5¢

Taylor & Boggs Foundry Co.:

Kidder's..... 50¢ @ 50¢ @ 10¢

Van Wagoner & Williams Hdw. Co.:

American Trackless..... 33¢ @ 45¢

Wilcox Mfg. Co.:

Bike Roller Bearing..... 60¢ @ 10¢

C. J. Roller Bearing..... 60¢ @ 10¢

Cycle Ball Bearing..... 50¢

Dwarf Ball Bearing..... 40¢

Ives..... 60¢ @ 10¢

L. T. Roller Bearing..... 60¢ @ 10¢

New Era Roller Bearing..... 50¢ @ 10¢

O. K. Roller Bearing..... 60¢ @ 10¢

Prindle, Wood Track..... 60¢

Richards' Wood Track..... 60¢

Richards' Steel Track..... 60¢ @ 10¢

Seal's Roller Bearing..... 60¢ @ 10¢

Tandem Nos. 1 and 2..... 60¢

Underwriters' Roller Bearing..... 40¢

Wilcox Auditorium Ball Bearing..... 40¢

Wilcox Barn Trolley No. 123..... 20¢

Wilcox Fire Trolley, Roller Bearing..... 10¢

Wilcox Le Roy Noiseless Ball Bearing..... 40¢

Wilcox New Century..... 50¢ @ 10¢ @ 10¢

Wilcox Trolley Ball Bearing..... 40¢

Harness Menders—See Menders.**Harness Snaps—See Snaps.****Hasps—**

McKinley's Perfect Hasp ½ doz. 10¢ @ 10¢

Wrought Hasps, Staples, &c.—See Wrought Goods.

Hatchets—

Best Brands..... 10¢ @ 10¢ @ 50¢

Cheaper Brands..... 50¢ @ 10¢ @ 50¢ @ 50¢

Note.—Net prices often made.

Hay and Straw Knives—See Knives.**Hinges—**

Blind and Shutter Hinges—

Surface Gravity Locking Blind:

(Victor; National; 1838 O. P.; Niagara; Clark's O. P.; Clark's Tip; Buffalo.)

No..... 1 3 5

Doz. pair..... \$0.75 1.35 2.60

Mortise Shutter:

(L. & P., O. S., Dixie, &c.)

No..... 1 1½ 2

Doz. pair..... \$0.65 .60 .55 .47

Mortise Reversible Shutter, (Buffalo, &c.)

No..... 1 1½ 2

Doz. pair..... \$0.65 .60 .55

Parker..... 70¢ @ 75¢

North's Automatic Blind Fixtures, No. 2, for Wood, \$9.00; No. 3, for Brick, \$11.50

Reading's Gravity..... 75¢ @ 10¢

Sargent's, Nos. 1, 3, 5..... 60¢ @ 10¢

Sargent's, Nos. 11 & 13..... 70¢ @ 10¢

Wright's Hardware Co.:

O. S. Lull & Porter..... 80¢ @ 25¢

Acme, Lull & Porter..... 75¢ @ 10¢

Queen City Reversible..... 75¢ @ 10¢

Stenger's Positive Locking, Nos. 1 & 3..... 70¢ @ 10¢

Shepard's Noiseless, Nos. 60, 65, 55..... 70¢ @ 10¢

Niagara Gravity Locking, Nos. 1, 3 & 5..... 75¢ @ 75¢

1988, Old Pat'n, Nos. 1, 3 & 5..... 75¢ @ 75¢

Tip Pat'n, Nos. 1, 3 & 5..... 75¢ @ 75¢

Buffalo Gravity Locking, Nos. 1, 3 & 5..... 75¢ @ 75¢

Shepard's Double Locking, Nos. 21 & 25..... 75¢ @ 10¢

Champion Gravity Locking, No. 75..... 75¢ @ 75¢

Seamboat Gravity Locking, No. 10..... 75¢ @ 75¢

Pioneer, Nos. 60, 45 & 55..... 75¢ @ 75¢

Empire, Nos. 101 & 103..... 70¢ @ 75¢

W. H. Co.'s Mortise Gravity Locking, No. 2..... 60¢ @ 10¢

Stanley's Steel Gravity Blind Hinges, ½ doz. sets \$1.20..... 20¢ @ 10¢

Gate Hinges—

Clark's or Shepard's—Doz. sets:

No..... 1 2 3

Hinges with Latches..... \$1.90 2.50 4.25

Hinges only..... 1.50 1.55 3.20

Latches only..... 0.70 0.70 1.30

New England:

With Latch..... doz. \$1.75 @ 1.80

Without Latch..... doz. \$1.40 @ 1.45

Reversible Self-Closing:

With Latch..... doz. \$1.65 @ 1.75

Without Latch..... doz. \$1.30 @ 1.35

Western:

With Latch..... doz. \$1.60 @ 1.65

Without Latch..... doz. \$1.00 @ 1.05

Wrightsville Hardware Co.:

Shepard's or Clark's, Nos. 1 & 2, 65¢ @ 75¢

Shepard's or Clark's, No. 3..... 55¢ @ 55¢

Spring Hinges—

Holdback, Cast Iron, gro. \$2.00 @ 10.00

Non-Holdback, Cast Iron..... gro. \$7.00 @ 17.50

J. Bardley

Bardley's Patent Checking..... 15¢

Bommer Bros.:

Bommer's..... 33¢ @ 45¢

Chicago Spring Butt Co.:

Chicago..... 20¢

Floor Hinge..... 40¢

Garden City Engine House..... 20¢

Keene's Saloon Door..... 20¢

Triple End..... 40¢

Coleman Hdw. Co.:

Champion Holdback..... ½ gr. \$10.00

J. G. C..... ½ gr. \$9.50

Nickel..... ½ gr. \$9.00

Lawson Mfg. Co.:

Matchless..... 30¢

Matchless Pivot..... 35¢

Parson Mfg. Co.:

Oblique, Dbl. Acting..... 50¢ @ 50¢ @ 55¢

Stover Mfg. Co.:

Ideal, No. 16, Detachable, ½ gr..... \$12.50

Ideal, No. 4..... ½ gr. \$8.00

New Idea No. 1..... ½ gr. \$9.00

New Idea Double Acting..... 45¢

Van Wagoner & Williams Hdw. Co.:

Acme, ¼ rt. Steel..... 30¢

Acme, Brass..... 50¢

American..... 30¢

Columbia, No. 14..... ½ gr. \$20.00

Columbia, No. 18..... ½ gr. \$25.00

Columbia, Adjustable..... 30¢

Gem, new list..... 25¢

Clover Leaf..... ½ gr. \$12.50

Oxford new list..... 25¢

Wrought Iron Hinges—

Strap and T Hinges, &c., list Mar. 15, 1899:

Light Strap Hinges..... 66¢ @ 75¢

Heavy Strap Hinges..... 70¢ @ 75¢

Light T Hinges..... 60¢ @ 65¢

Heavy T Hinges..... 60¢ @ 65¢

Extra Heavy T Hinges..... 60¢ @ 65¢

Hinge Hasps..... 45¢

Cor. Heavy Strap..... 70¢

Cor. E. Heavy T..... 60¢ @ 65¢

Rolled Plate..... 70¢ @ 70¢ @ 55¢

Screw Hook 6 to 12 in., lb. 2 ½ @ 3 c

Ladies—Melting—

L. & G. Mfg. Co.	60%
P. S. & W.	40% to 40% 10%
Reading	50% to 10%
Sargent's	40% to 40% 10%

Lanterns—Tubular—

Regular Tubular	doz. \$5.50 to \$5.60
Slide Lift Tubular	doz. \$4.75 to \$5.25
Square Lift Tubular	doz. \$4.75 to \$5.25
Other Styles	40% to 10% to 10% 5%

Bull's Eye Police—

2 1/2-inch flash light	doz. \$3.50 to \$3.75
3-inch flash light	doz. \$3.00 to \$3.25
2 1/2-inch regular	doz. \$3.25 to \$3.50
3-inch regular	doz. \$3.50 to \$3.75

Latches, Thumb—

Roggin's Latches	doz. \$2 to \$3
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Lawn Mowers—

See Mowers, Lawn.

Leaders, Cattle—

Small	doz. 45c; large, 55c
Covert Mfg. Co.	45c to 2%

Lemon Squeezers—

See Squeezers, Lemon.

Lifters, Transom—

Dickson	3 x 4 ft. x 1/2" \$100 to \$11.00
Other sizes, iron	70% to 10%
Other sizes, brass and bronze	70%
Excelsior	60% to 60% 10%
Payson's	60% to 60% 10%

Bold Grip Nos. 649 and 644	per doz. \$1.00
Bronzed Iron	70%

Lines—

Wire Clothes, Nos. 18	19	20
100 feet	\$2.20	\$1.00 1.65
75 feet	\$1.80	1.70 1.50

Crown Solid Braided Chalk—

Mason's, No. 0 to No. 5	83% to 83%
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Samson Cordage Works—

Solid Braided Chalk, No. 0 to 3	40%
Silver Lake Braided Chalk, No. 0, \$6.00;	
No. 1, \$6.50; No. 2, \$7.00; No. 3, \$7.50	
per gr.	30%

Looks, &c.—Cabinet—

Cabinet Locks	55% to 55% 7%
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Door Locks, Latches, &c.—

[Net prices are very often made on these goods.]

Reading Hardware Co.—

R. & E. Mfg. Co.	40%
Sargent & Co.	40% to 40% 10%
Slaymaker-Harry Co.	30% to 35%
Snow's Victor	50% to 10%

Elevator—

Stowell's	83% to 83%
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Padlocks—

Wrought Iron, list Dec. 3, '97	75% to 10%
Dog Collar, S. B. Co.	40%
R. & E. Mfg. Co. Wrt Steel and Brass	50%
S. B. Co.	40%

Sash, &c.—

Fitch's Bronze and Brass	66%
Fitch's Iron	70%
Ives' Patent	55% to 55% 50%
Oeffinger's Automatic	50%
Payson's Perfect	70%
Payson's Signal (new list)	75%
Reading	60% to 10% to 70%

Machines—**Boring—**

Without Augers	
Upright	Angular.

Improved No. 9	\$4.25	No. 1 \$3.00
Improved No. 4	3.75	No. 9 \$3.00
Improved No. 5	2.75	
Jennings	2.50	3.00
Miller's Falls		5.75
Snell's Rice's Pat.	2.50	
Ewan's, No. 500	5.10	No. 200 6.45

Hoisting—

Moore's Anti-Friction Differential Pulley Block	30%
Moore's Hand Hoist with Lock Brake	30%

Ice Cutting—

Chandler's	15%
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Washing—

Wayne American	per doz. \$28.00
Western Star, No. 2	28.00
doz.	28.00
Western Star, No. 3	30.00
St. Louis, No. 41	per doz. 60.00

Mallets—

Hickory	45% to 50% to 5%
Lignumvitae	55% to 50% to 5%
Tinners', Hickory and Applewood	doz. 50% to 55%
Fiber Head Stearns'	30% to 10%

Mats—Door—

Elastic Steel (W. G. Co.)	10%
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Mattocks—

See Picks and Mattocks.

Meat Cutters—

See Cutters, Meat.

Milk Cans—See Cans, Milk—**Mills—Coffee—**

Boz and Side, list Jan. 1, '98	50% to 10% to 60% 5%
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Net prices are often made on some goods which are lower than above discounts.

Enterprise Mfg. Co.—

National, list Jan. 1, '98	25% to 30%
Parker's Columbia and Victor	30%

Parker's Box and Slide—

Swift, Lane Bros.	50% to 10% to 60% 30%
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Mining Knives—

See Knives, Mining.

Molasses Gates—

See Gates, Molasses.

Money Drawers—

See Drawers, Money.

Mowers, Lawn—

Net prices are generally quoted.

Cheap.....all sizes, \$2.00

Good.....all sizes, \$2.50 to \$2.75

High Grade 4 1/2 4 3/4 4 7/8 5 00

Pennsylvania and Continental 60% to 10% 5%
Quaker City	70% to 5%
Great American	70% to 5%
Philadelphia	
Styles M. S. Co., K., T.	70% to 5%
Style A, all Steel	60% to 10%
Style E, Low Wheel	60% to 10%
Style E, High Wheel	70% to 10% 5%
Drexel and Gold Coin, low list	50% to 5%
Nails—

Cut and Wire. See Trade Report.

Wire Nails and Brads, Papered.

List July 20, 1899.....85% to 85% 10%

Hungarian, Finishing, Upholsterers', &c. See Tacks

Horse—

Nos. 6 7 8 9 10	
A. C.	25% 23% 22% 21% 21%

Capewell	10% 18% 17% 16% 16% 10% 5%
C. B. K.	25% 25% 22% 21% 21% 40%
Champion	28% 26% 25% 24% 23% 40%

Maud S.	25% 23% 22% 21% 21% 50%
Neponset	25% 21% 20% 19% 18% 40%
Putnam	23% 21% 20% 19% 18% 33% 40%
Standard	23% 21% 20% 19% 18% 40%
Star	23% 21% 20% 19% 18% 35% 40%
Vulcan	23% 21% 20% 19% 18% 25% 10%

Picture

1 1/2 x 2 1/2	5 5 1/2 in.
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Brass Head	45 60 70 95 100 gro.
Por. Head	1.10 1.10 1.10 1.10 gro.

Nippers, See Pliers and Nippers.**Nut Crackers—**

See Crackers, Nut.

Nuts—

List Feb. 1, '99.

Cold Punched Off

Mfrs. or U. S. Standard. list.

Hexagon, plain	6.50c
Square, plain	6.50c
Square, C. T. & R.	6.90c
Hexagon, C. T. & R.	7.60c

Hot Pressed:

Mfrs., U. S. or Nar. Gauge Stand.

Square Blank or Tapped.....6.50c

Hexagon Blank or Tapped.....7.10c

Oakum—

Best or Government	lb. 6 1/2c
Navy	lb. 5 c
U. S. Navy	lb. 6 1/2c
Plumbers' Spun Navy	5 c

In carload lots 1/4 lb. off f.o.b. New York.

Oil, Axle—

Snow Flake	
1 qt. cans, per doz.	\$3.00
1 gal. cans, per doz.	\$4.80
5 gal. cans, per doz.	\$6.00

Oil Tanks—See Tanks, Oil.**Oilers—**

Brass and Copper	40% to 10% 50%
Tin or Steel	60% to 10% 65%
Zinc	60% to 10% 65%

Malleable, Hammers' Improved, No. 1.

\$3.50; No. 2, \$4.10; No. 3, \$4.40	per doz. 20%
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Malleable, Hammers' Old Pattern.

same list	50% to 10%
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Wilmot & Hobbs Mfg. Co.

Spring Bottom Cans	70% to 10%
Railroad Oilers etc.	60% to 10%

Openers—**Can—**

French	doz. 55c
Iron Handle	doz. 55c to 57c
Sprague, Iron Hdl.	per doz. 55c to 60c
Sardine Scissors	doz. \$1.75 to \$3.00
Tip Top	per doz. \$0.75
National, per gro.	\$1.75 to \$2.00
Stowell's	per doz. 40% to 45%
Waldorf, per gro.	\$2.00

Nickel Plate—

per doz.	\$2.00
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Silver Plate—

per doz.	\$4.00
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Packing—**Rubber—**

Standard, fair quality	70% to 10% 75%
Inferior quality	75% to 10% 80%
Extra	80% to 10% 85%
Jenkins' standard	80% to 10% 85%

Miscellaneous—

American Packing	50% to 10c lb.
Cotton Packing	15% to 10c lb.
Italian Packing	10% to 10c lb.
Jute	50% to 50c lb.
Russia Packing	15% to 10c lb.

Pails—**Creamery—**

E. & Co. with gauges	No. 1 \$6.50;
No. 2, \$6.75	per doz.

Galvanized—

Price per gro.	
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Inch	10	15	14
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Water, Regular	18 00	21 00	24 00
Water, Heavy	22 00	25 00	28 00
Fire, Rd. Bottom	31 00	33 00	35 00
Well	27 00	29 00	31 00

Pans—**Dripping—**

Standard List	60% to 60% 5%
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Fry—

Standard List	75% to 10% 80%
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Roasting and Baking—

Regal, S. S. & Co., per doz.	Nos. 5, \$4.50;
10 \$5.00; 20 \$5.50; 30 \$6.00;	
Simplex, per gro., No. 40	\$30.00; 50,
\$34.50; 60 \$39.00; 140, \$33.00; 150,	
\$37.50; 160, \$43.00.	

Paper—**Building Paper—**

Per roll	
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Rosin Sized Sheathing: 500 sq. ft.

Light wt. 20 sq. ft. to lb. \$0.40 to 0.45

Medium wt., 12 sq. ft. to lb. 80c

Heavy wt., extra quality, \$0.95 to 1.05

Medium Grades Water Proof

Sheathing.....\$0.80 to 1.25

Deafening Felt, 3, 6 and 1 1/2 sq. ft.

to lb., ton.....\$2.00

York Haven Waterproof Sheathing.....\$1.35 to 1.75

Tarred Paper.

1 ply (roll 300 sq. ft.), ton	\$25.00
2 ply, roll 100 sq. ft.	55c
3 ply, roll 100 sq. ft.	80c

Sand and Emery—

List Dec. 23, 1899	50% to 10% 50% 10% 5%
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See Trade Report.

Parers—**Apple—**

Advance	per doz. \$4.50
Baldwin	doz. \$5.00
Bonanza	each \$5.00
Dandy	each \$7.50
Eureka, 1898	each \$16.00
Family Bay State	per doz. \$12.00
Hudson's Little Star	per doz. \$4.00
Hudson's Rooking Table	per doz. \$5.50
Improved Bay State	per doz. \$27.00 to 30.00
New Lightning	per doz. \$5.50
Reading 72	per doz. \$4.00
Reading 75	per doz. \$7.00
Turn Table	per doz. \$5.50
White Mountain	per doz. \$4.00

Potato—

Saratoga	per doz. \$5.50
White Mountain	per doz. \$4.50

Picks and Mattocks—

List Feb. 23, 1899	75% to 75% 10%
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Pinking Irons—

See Irons, Pinking.

Pins—**Escutcheon—**

Brass	per doz. 60% to 10%
Iron, list Nov. 11, '95	60% to 10%

Pipe, Cast Iron Soil—

Factory Shipments.

Standard, 2-6 in.	70% to 70% 5%
Extra Heavy, 2-6 in.	75%
Fittings	75% to 10% 80%

Pipe, Merchant, Boiler**Tubes, &c.—**

Carloads to Consumers.

Merchant Pipe.

Black	Galva-
nized.	

Shovels and Tongs—

Brass Head.....60¢ to 60¢ 10¢
Iron Head.....60¢ to 60¢ 10¢

Sieves and Sifters—

Hunter's Imitation, gro. \$11.00 to 12.00
Buffalo Metallic Blue, S. S. & Co., 7 gr.:
14 & 16.....18 & 20
12 & 20.....15.00
Electric Light.....7 gr. \$10.00
Hunter's Genuine.....7 gr. \$12.50
Shaker (Barber's Pat.) Flour Sifters.
7 doz., \$3.00.....30¢

Sieves, Tin Rim—

Inch.....Per dozen 18 80
Black, full size.....\$0.95 98 1.00 1.10
Plated, full size.....\$1.08 1.03 1.10 1.20
Black, scant.....\$0.78 .80 .85

Sieves, Wooden Rim—

Nested, 10, 11 and 12 Inch.
Mesh 18, Nested, doz.....\$0.75 to 0.80
Mesh 20, Nested, doz......35¢ .90
Mesh 30, Nested, doz.....1.00 to 1.05

Sinks—

Cast Iron—
Standard list.....60¢ to 60¢ 10¢
NOTE—There is not entire uniformity
in size used by jobbers.

Wrought Steel—

Columbus Galv'd and Enamelled.....60¢ to 5¢
Columbus, Plated.....45¢
L. & G. Mfg. Co., Galvanized.....50¢
L. & G. Mfg. Co., Enamelled.....50¢

Sinks, Wagon—

Cast iron.....70¢ to 10¢ 75¢
Malleable iron.....10¢ to 10¢ 50¢
Steel.....10¢ to 10¢ 10¢

Slates—

"D" Slates.....60¢ to 10¢ 50¢ to 10¢ 10¢
Unexcelled Noiseless Slates.....
60¢ to 10¢ 50¢ to 10¢ 50¢

Wire Bound.....10¢ to 10¢ 50¢
Double Slates, add \$1 case, net.

Slaw Cutters—See Cutters.**Slicers, Vegetable—**

Standard \$2.00.....33¢ to 5¢
Snap, Harness—
German.....10¢ to 10¢ 10¢

German Mfg. Co.—

Derby.....35¢ to 5¢
High Grade.....45¢ to 5¢
Jockey.....45¢ to 5¢
Trojan.....45¢ to 5¢

German's Saddle Works—

Saddle.....60¢ to 10¢
Crown.....60¢ to 10¢
Triumph.....60¢ to 10¢

W. & E. T. Fitch Co.—

Bristol.....40¢ to 10¢
Empire.....50¢ to 5¢
German.....40¢
National.....50¢ to 5¢
Perfect.....50¢ to 5¢
Champion.....40¢
Security.....40¢
Victor.....60¢ to 5¢

Onida Community—

Solid Steel.....65¢ to 65¢ 10¢
Solid Steel.....65¢ to 65¢ 10¢
Sergeant's Patent Guarded.....60¢ to 10¢

Snaths—

Scythe.....65¢ to 5¢
Snips, Tinnings—See Shears.

Soldering Irons—

See Irons, Soldering.

Spoke Trimmers—

See Trimmers, Spoke.

Spoons and Forks—

Silver Plated—
Flat Ware.....50¢ to 10¢ 60¢ to 10¢
Wm. Rogers Mfg. Co.....50¢ to 10¢

Miscellaneous—

German Silver.....60¢ to 10¢
Wm. Rogers Mfg. Co.:
185 German Silver.....60¢
Rogers' Silver Metal.....50¢ to 10¢

Springs—

Door—
Cam (Coil).....20¢
Star (Coil).....30¢
Torrey's Rod, 99 in.....\$1.10 to \$1.25
Warner's No. 2, 7 doz. \$2.50; No. 3,
\$3.00.....60¢ to 10¢
Victor (Coil).....50¢ to 10¢ 10¢

Carriage, Wagon, &c.

Factory Shipments.
1 1/2 in and wider.....Blk. Hf. Brt. Brl.
4 1/2 4 1/2 4 1/2 4 1/2 lb
Cliff's Bolster Springs.....35¢
Cliff's Seat Springs.....\$ pair 55¢

Sprinklers, Lawn—

Enterprise.....25¢ to 30¢
Philadelphia No. 1, 7 doz. \$12; No. 2,
\$15; No. 3, \$24.....30¢

Squares—

Nickel plated.....List Jan. 6, 1900
Steel and Iron.....70¢ to 5¢
Rosewood Hdl. Try Square and T-Bevels.....60¢ to 10¢ 70¢
Green Hdl. Try Squares and T-Bevels.....10¢ to 10¢ 10¢ to 10¢

Trimmer's Try Sq. and T-Bevels—

Waterbottom's Try and Miter.....50¢ to 10¢
Squeezers—
Lemon—
Wood, Common, gro., No. 1, \$5.25
to \$5.50; No. 1, \$5.25 to \$5.50.
Wood, Porcelain Lined—
Cheap.....doz. \$3.00 to \$7.75

Good Grade.....doz. \$5.00 to \$5.50
Tinned Iron.....doz. \$0.75 to \$1.50
Iron, Porcelain Lined doz. \$2.50 to \$3.50
Jennings' Star.....7 doz. \$1.55 to \$1.90
Klug.....7 doz. \$2.00

Staples—

Barbed Blind.....lb. 8 1/2 to 9 1/2¢
Electricians' Association list.....7¢ to 10¢
Fence Staples, same price as Barbed
Wire. See Trade Report.
Poultry Netting, Staples.....per lb. 5¢
Grand Crossing Tack Co.'s list.....80¢ to 10¢

Steels, Butchers'—

Dick's.....40¢
Foster Bros.....30¢
C. & A. Hoffmann's.....40¢
Nichols Bros.....50¢

Steelyards.....25¢ to 5¢ 10¢**Stocks and Dies—**

Blacksmiths'.....40¢ to 40¢ 10¢
Gardner Die Stocks No. 1.....50¢
Gardner Die Stocks, larger sizes.....40¢
Green River.....25¢
Lightning Screw Plate.....25¢
Little Giant.....25¢
Reece's New Screw Plates.....25¢ to 30¢
Curtis Reversible Ratchet Die Stock.....25¢

Stone—**Soythe Stones—**

Chicago Wheel & Mfg. Co.:
Gem Corundum, 10 inch, \$10.50 per
gro., 12 inch, \$12.00
Cleveland Stone Co., list Nov. '99.....33¢ to 45¢
Pike Mfg. Co., list '95-'96.....33¢ to 45¢

Oil Stones, &c.

Chicago Wheel & Mfg. Co.:
Corundum Oil, Double Grit.....50¢
Corundum Oil, Single Grit.....35¢
Pike Mfg. Co.:
Hindustan No. 1, 7 doz. \$8
Turkey Oil Stone, Extra.....33¢ to 45¢
5 to 5 in.....80¢
Turkey Slips.....\$1.50
Lily White Washita.....80¢
Royal Red Washita.....80¢
Washita Stone, Extra.....50¢
Washita Stone, No. 2.....30¢
Lily White Slips.....90¢
Royal Red Slips.....90¢
Washita Slips, Extra.....80¢
Washita Slips, No. 1.....70¢
Arkansas Stone, No. 1, 3 to 5 in. \$2.50
Arkansas Stone, No. 1, 5 to 8 in. \$3.50
India Oil Stones.....25¢
Tantle Mills:
Emery Oil, 7 doz. \$5.00.....50¢ to 60¢

Stoners—**Cherry—**

Enterprise.....25¢ to 30¢

Stops, Bench—

Millers Falls.....15¢ to 10¢
Morrill's.....7 doz. No. 1, \$10.00; No. 2,
\$11.00; No. 3, \$12.00

Stops, Window—

Ives' Patent.....25¢ to 5¢
Wilcox, Steel, per doz., \$4.00.....50¢

Stove Boards—**See Boards, Stove.****Stove Polish—See Polish, Stove.****Strainers, Pump—**

Diamond Joe Pump Strainers.....per doz. 75¢

Straps, Box—

Cary's Universal, case lots.....20¢ to 10¢

Stretchers, Carpet—

Cast Iron, Steel Points.....doz. 55¢ to 65¢
Cast Steel, Polished.....doz. 35¢ to 55¢
Socket.....doz. \$1.75

Stuffers, Sausage—

Miles' Challenge, 7 doz. \$20.....50¢ to 50¢ 5¢
Enterprise Mfg. Co.....25¢ to 25¢ 7¢ to 1¢
National Specialty Mfg. Co., list Jan.
1, '97.....30¢

Tacks Brads, &c.—

See Trade Report.
List Jan. 15, '99.
Carpet Tacks, American.....90¢ to 10¢ 5¢
American Cut Tacks.....90¢ to 10¢ 5¢
Swedes Iron Tacks.....90¢ to 10¢ 5¢
Swedes Upholsterers' Tacks.....90¢ to 10¢ 5¢
Gimp Tacks.....90¢ to 10¢ 5¢
Lace Tacks.....90¢ to 10¢ 5¢
Trimmers' Tacks.....90¢ to 10¢ 5¢
Looking Glass Tacks.....70¢ to 10¢ 5¢
Bill Posters' and Railroad Tack.....80¢ to 10¢ 5¢
Hungarian Nails.....80¢ to 10¢ 5¢
Common and Patent Brads.....70¢ to 10¢ 5¢
Trunk and Clout Nails.....80¢ to 10¢ 5¢

NOTE—The above prices are for
straight weights. An extra 5¢ is given
Star weights and an extra 10¢ on
Standard weights.

Miscellaneous—

Double Point Tacks.....90¢ to 7 tens
Steel Wire Brads, R. & E. Mfg.
Co.'s list.....50¢ to 10¢ 60¢
See also Nails, Wire.

Tanks, Oil—

Emerald, S. S. & Co.....30-gal. \$3.90
Emerald, S. S. & Co.....60-gal. \$4.00
Queen City S. S. & Co., 50-gal. \$3.50
Queen City S. S. & Co., 60-gal. \$4.25

Tapes, Measuring—

American Asse's Skin.....10¢ to 10¢ 50¢
Patent Leather.....25¢ to 30¢ 5¢
Steel.....10¢ to 10¢ 5¢

Chesterman's.....25¢ to 5¢ 5¢
Eddy's Steel.....40¢ to 40¢ 5¢
Eddy's Metallic.....35¢ to 35¢ 5¢
Kauffel & Esser Co., Steel and Metallic.
Lower list, 1899.....35¢
Lufkin's Steel.....35¢ to 35¢ 5¢
Lufkin's Metallic.....30¢ to 30¢ 5¢

Thermometers—

Tin Case.....80¢ to 80¢ 10¢

Ties, Bale—Steel.

Standard Wire.....50¢ to 10¢ 5¢

Ties, Wall—

Cleveland Wire Spring Co.:
Galv. St. el 5 3/2 x 8 1/4 in. 7 1000. \$10.00
Galv. Steel 5 3/2 x 8 1/4 in. 7 1000. \$11.00
Galv. Steel 5 3/2 x 1 1/4 in. 7 1000. \$12.00
Galv. Steel 5 3/2 x 1 1/4 in. 7 1000. \$14.00

Tinners' Shears, &c.—

See Shears, Tinnings, &c.

Tinware—

Stamped, Japanned and Piced, sold
very generally at net prices.

Tire Benders, Upsetters,

&c.—See Benders and Upset-

ters, Tire.

Tobacco Cutters—

See Cutters, Tobacco.

Tools—**Coopers'—**

L. & J. White.....20¢ to 20¢ 5¢

Saw—

Atkins' new list.....40¢
Simonds' Improved.....33¢ to 45¢
Simonds' Crescent.....25¢

Ship—

L. & J. White.....25¢

Transom Lifters—

See Lifters, Transom.

Traps— Game—

Oneida Pattern.....70¢ to 10¢ 75¢ to 10¢
Newhouse.....45¢ to 50¢
Hawley & Norton.....65¢ to 70¢
Victor (Oneida Pattern).....75¢ to 75¢ 10¢
Star (Blake Pattern).....65¢ to 70¢ 5¢

Mouse and Rat—

Mouse, Wood, Choker, doz. holes 9 to 9 1/2 c
Mouse, Round or Square Wire.....
doz. \$0.85 to 1.00
Diamond Joe Mouse Traps.....per doz. 60¢
Diamond Joe Rat Traps.....per doz. \$1.00
Marty French Rat and Mouse Traps
(Genuine).....
No. 1, Rat, Each \$1.12 1/2; 7 doz. \$12.00
No. 2, Rat, 7 doz. \$6.00; case of 50
\$0.25 doz.
No. 3 1/2, Rat, 7 doz. \$4.75; case of 75
\$4.25 doz.
No. 4, Mouse, 7 doz. \$3.50; case of 72
\$2.75 doz.
No. 5, Mouse, 7 doz. \$2.75; case of 72
\$2.25
Schuyler's Rat Killer, No. 1, 7 gr. \$30.00;
No. 2, 7 gr. \$30.00; Mouse, No. 3,
\$15.00.....50¢

Fly—

Balloon, Globe or Acme.....
doz. \$1.15 to 1.55; gro. \$12.00 to 15.00
Harper, Champion or Paragon.....
doz. \$1.25 to 1.40; gro. \$13.50 to 15.00

Trimmers, Spoke—

Bonney's No. 1 and 2.....40¢
Stearns.....25¢

Trowels—

Diston Brick and Pointing.....80¢
Diston Plastering.....55¢
Diston "Standard Brand" and Gar-
den Trowels.....40¢
Never-Break Steel Garden Trowels.....
gro. \$7.00
Peace's Plastering.....30¢
Rose Brick and Plastering.....25¢ to 5¢
Woodrough & McFarlin, Plastering.....25¢ to 10¢

Trucks, Warehouse, &c.—

R. & L. Block Co.'s list.....40¢
Daly Stove Trucks, Improved pattern
7 doz. \$21.00
Model Stove Trucks.....7 doz. \$18.50

Tubs, Wash—

No. 1 3 3
Galvanized, per doz. \$5.00 5 50 6.00
Galvanized Wash Tubs (S. S. & Co.):
No. 1 2 3 10 20 30
Per doz \$5 25 6.00 6.75 6.50 7.25 8.00

Twine—**Miscellaneous—**

Flax Twine— BC B.
No. 9, 1/4 and 1/2-lb. Balls.....22¢ 26¢
No. 12, 1/4 and 1/2-lb. Balls.....18¢ 21¢
No. 18, 1/4 and 1/2-lb. Balls.....18¢ 19¢
No. 24, 1/4 and 1/2-lb. Balls.....15¢ 18¢
No. 36, 1/4 and 1/2-lb. Balls.....15¢ 18¢
Chalk Line, Cotton, 1/2-lb. Balls.....
22¢ to 24¢
Cotton Mops, 6, 9, 12 and 15 lb. to
doz.....10¢ to 10¢ 7¢ to 8¢
Cotton Wrapping, 5 Balls to lb.....
10¢ to 10¢ 5¢
American 3-Ply Hemp, 1/4 and 1/2-lb.
Balls.....15¢ to 15¢ 15¢
American 3-Ply Hemp, 1-lb. Balls.....
15¢ to 15¢ 15¢
India 3-Ply Hemp, 1/4 and 1/2-lb.
Balls (Spring Twine).....10¢ to 10¢
India 3-Ply Hemp, 1-lb. Balls.....10¢

India 3-Ply Hemp, 1/4-lb. Balls.....

2, 3, 4 and 5-Ply Jute, 1/2-lb. Balls.....

Mason Line, Linen, 1/2-lb. Balls.....
No. 25, Mattress, 1/4 and 1/2-lb. Balls.....
Wool.....

Vises—

Solid Box.....40¢ to 40¢ 10¢

Bonney's Saw Vises.....40¢ to 40¢ 10¢

Parallel—

Athol Machine Co.:
Simpson's Adjustable.....40¢
Standard.....40¢
Amateur.....40¢
Bonney's.....40¢
Finley & Norris Double Screw.....15¢ to 15¢
Hollands:
Machinists'.....40¢
Keystone.....40¢
Lewis Tool Co.....40¢
Massey's Perfect.....15¢ to 15¢
Massey's Clincher.....36¢ to 36¢
Merrill's.....40¢
Miller's Falls.....40¢
Parker's:
Victor.....20¢ to 20¢
Regular.....20¢ to 20¢
Vulcan's.....40¢ to 40¢
Combination Pipe.....55¢ to 55¢
Prentiss.....40¢ to 40¢
Sargent's.....40¢
Simpson's Adjustable.....40¢
Sneliker's X.....40¢
Stephens'.....40¢ to 40¢
Toles' Woodworking.....25¢
Van, W. & W. Hdw. Co.....40¢

Saw Filers—

Bonney's No. 1, \$13; No. 2, \$16. 50¢ to 10¢
Diston's D 3 Clamp and Guide, 7 doz.
\$30.....25¢
Reading.....40¢ to 40¢ 10¢
Wentworth's Rubber Jaw, Nos. 1, 2
and 3.....30¢ to 7¢ 5¢

Miscellaneous—

Signal & Keeler Combination Pipe
Vise.....60¢
Parker's Combination Pipe:
87 Series.....60¢
187 Series.....60¢ to 5¢
No. 870.....40¢

Wads—Price Per M.

B. E., 11 up.....60¢
B. E., 9 and 10.....70¢
B. E., 8.....80¢
B. E., 7.....80¢
P. E., 11 up.....\$1.00
P. E., 9 and 10.....1.25
P. E., 8.....1.50
P. E., 7.....1.50
Ely's B. E., 11 and larger.....\$1.70 to 1.75
Ely's P. E., 12 to 20.....\$3.00 to 3.25

Wagon Jacks—

See Jacks, Wagon.

Ware, Hollow—

Aluminum—
S. S. & Co. Reduced List.....40¢

Cast Iron, Hollow—

Stove Hollow Ware:
Ground.....65¢ to 65¢ 10¢
Unground.....70¢ to 70¢ 10¢
White Enamelled Ware:
Maslin Kettles.....80¢ to 80¢ 10¢
Boilers and Saucepans.....60¢ to 60¢ 5¢
Tinned Boilers and Saucepans.....
50¢ to 50¢ 5¢
See also Pots, Glue.

Enamelled—

Agate Nickel Steel Ware, list July '99, 35¢
Granite Ware, list Jan. 1, '94, revised
Jan. 2, '95.....40¢ to 10¢
Second Quality, Agate Nickel Steel.....65¢
Second Quality, Granite.....
70¢ to 10¢ 70¢ to 10¢ 10¢
Iron Clad:
Peppered Ware, high list.....70¢
Mottled Ware, high list.....75¢
Never Break Enamelled.....50¢ to 50¢ 10¢

Tea Kettles—

Galvanized Tea Kettles:
Inch.....6 7 8 9
Each.....55¢ 55¢ 55¢ 55¢

Steel Hollow Ware.

Avery Spiders & Griddles.....65¢ to 65¢ 5¢
Avery Kettles.....90¢
Porcelain.....50¢ to 50¢ 10¢
Never Break Spiders and Griddles.....
65¢ to 65¢ 5¢
Never Break Kettles.....60¢ to 60¢ 10¢
Solid Steel Spiders & Griddles.....65¢ to 65¢
Solid Steel Kettles.....90¢
Solid Steel Ware, Enamelled.....50¢ to 50¢ 5¢

Silver Plated Hollow—

William Rogers Mfg. Co.....40¢ to 10¢ 5¢

Washboards—

Solid Zinc:
Crescent, family size, bent frame.....\$3.00
Red Star, laundry size, station-
ary protector.....\$4.25
Double Zinc Surface:
Eaglesaw Globe, family size, station-
ary protector.....\$2.65
Wilson, family size, bent frame.....\$2.75
Single Zinc Surface:
Kalam protector, family size, open
back perforated.....\$2.40
Eaglesaw globe, protector, family
size, ventilated back.....\$2.25
Wilson, bent frame family size,
ventilated back.....\$2.25

Washers—	
Leather, Axle—	
1/2 in. 10c	1 1/2 in. 10c
1 1/2 in. 10c	2 in. 10c
2 in. 10c	2 1/2 in. 10c
2 1/2 in. 10c	3 in. 10c
3 in. 10c	3 1/2 in. 10c
3 1/2 in. 10c	4 in. 10c
4 in. 10c	4 1/2 in. 10c
4 1/2 in. 10c	5 in. 10c
5 in. 10c	5 1/2 in. 10c
5 1/2 in. 10c	6 in. 10c
6 in. 10c	6 1/2 in. 10c
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7 1/2 in. 10c	8 in. 10c
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96 in. 10c	96 1/2 in. 10c
96 1/2 in. 10c	97 in. 10c
97 in. 10c	97 1/2 in. 10c
97 1/2 in. 10c	98 in. 10c
98 in. 10c	98 1/2 in. 10c
98 1/2 in. 10c	99 in. 10c
99 in. 10c	99 1/2 in. 10c
99 1/2 in. 10c	100 in. 10c

Weights, Sash—	
Eastern prices.....\$25.00	
Western prices.....\$18.00@19.00	
Note—There is a wide difference in prices East and West, and some Foundries are naming lower prices than the above.	
Well Buckets, Galvanized	
See Pails, Galvanized.	
Wheels Well—	
8-in. \$1.65@1.75; 10-in. \$2.00@2.10;	
12-in. \$2.50@2.75; 14-in. \$4.25@4.40	
Wire and Wire Goods—	
Brt. and Ann. 6 to 9.....70¢@10¢	
Brt. and Ann. 10 to 18.....78¢@85¢	
Brt. and Ann. 19 to 26.....75¢@74¢	
Brt. and Ann. 27 to 36.....75¢@10¢	
Cop'd and Galv. 6 to 9.....65¢@65¢	
Cop'd and Galv. 10 to 13.....70¢	
Cop'd and Galv. 19 to 26.....70¢@10¢	
Cop'd and Galv. 27 to 36.....72¢@65¢	
Tinned, 6 to 14.....70¢@10¢	
Tinned, 15 to 18.....70¢@65¢	
Tinned, 19 to 26.....70¢	
Tinned, 27 to 36.....65¢@10¢	
Annealed Wire on Spools.....70¢@5¢	
Brass and Copper Wire on Spools.....60¢@60¢	
Brass, list Feb. 26, '96.....20¢	

Copper, list Feb. 26, '96.....15¢	
Cast Steel Wire.....60¢	
Stubs' Steel Wire.....\$5.00 to \$2.40	
Wire Clothes Line, see Lines.	
Wire Plating Cord, see Cord.	
Bright Wire Goods—	
Iron and Brass, list July 1, 1899.....85¢@10¢	
Wire Cloth and Netting—	
Galvanized Wire Netting.....30¢@10¢	
Painted Screen Cloth per 100 ft.....\$1.30@1.40	
Hardware Grade, Iron:	
2 to 20 mesh.....sq. ft. 3¢@3¢	
20 to 20 mesh.....sq. ft. 3¢@3¢	
Galv. Hardware Grade, 2 to 5 mesh.....sq. ft. 3¢@3¢	
Galv. Hardware Grade, 6 to 8 mesh.....sq. ft. 4¢@4¢	
Wire Barb—See Trade Report.	
Wire, Rope—See Rope, Wire.	
Wrenches—	
Agricultural.....70¢@10¢	
Case lots.....75¢@10¢	
Baxter's S.....60¢@10¢	
Coe's Genuine.....40¢@10¢	
Coe's Mechanics.....40¢@10¢	
Acme.....60¢@10¢	
Alken's Pocket (Bright).....50¢@10¢	
Alligator.....60¢@10¢	

Bemis & Call's:	
Adjustable S.....35¢@5¢	
Adjustable S Pipe.....40¢	
Brig's Pattern.....30¢@10¢	
Combination Black.....40¢@5¢	
Combination Bright.....40¢	
Cylinder or Gas Pipe.....55¢	
Extra Heavy.....45¢	
Merrick's Pattern.....50¢	
No. 3 Pipe, Bright.....55¢	
Bindley Automatic.....30¢	
Boardman's.....33¢@4¢	
Bull Dog, W. & B.....60¢@10¢	
Donohue's Pattern.....40¢@10¢	
Eagle.....60¢@10¢	
Hercules.....70¢	
Solid Handles, F. A. & W.....50¢@10¢	
Stevenson.....60¢@10¢	
Wrought Goods—	
Staples, Hooks, etc., list March 17 '92.....85¢@10¢	
Yokes, Neck—	
Covert Saddlery Works, Trimmer, 1.60¢@5¢	
Covert Saddlery Works, Neck Yoke Centers.....70¢	
Yokes, Ox, and Ox Bows—	
Fort Madison's Farmers & Freighters' list not	
Zinc—	
Sheet.....lb. 6¢@7¢	

PAINTS, OILS AND COLORS.—Wholesale Prices.

White Lead, Zinc, &c.	
Lead, Foreign white, in Oil.....7¢@9¢	
Lead, American white, in Oil.....7¢@9¢	
Lots of 500 lb or over.....6¢@4¢	
Lots less than 500 lb.....6¢@4¢	
Lead, White, in oil, 25 lb tin.....3¢	
Lead, White, in oil, 12 1/2 lb tin.....3¢	
Lead, White, in oil, 1 lb.....1¢	
Lead, White, in oil, 1 to 5 lb assorted tins, add to keg price.....1¢@1¢	
Lead, White, Dry in bbls.....6¢@5¢	
Lead, American, Terms: On lots of 500 lbs and over, 60 days, or 25 for cash if paid in 15 days from date of invoice.	
Zinc, American, dry.....7¢@4¢	
Zinc, Paris, Red Seal, dry.....8¢@8¢	
Zinc, Paris, Green Seal, dry.....8¢@8¢	
Zinc, Antwerp Red Seal, dry.....7¢@8¢	
Zinc, Antwerp, Green Seal, dry.....8¢@8¢	
Zinc, V. M. French, in Poppy Oil, Green Seal.....12¢@12¢	
Lots of 1 ton and over.....12¢@12¢	
Lots less than 1 ton.....12¢@12¢	
Zinc, V. M. French, in Poppy Oil, Red Seal.....10¢@11¢	
Lots of 1 ton and over.....10¢@11¢	
Lots less than 1 ton.....11¢@11¢	
Discounts.—V. M. French Zinc.—Discounts to buyers of 10 bbl. lots of one or assorted grades, 15; 25 bbls., 25; 50 bbls., 45.	
Dry Colors.	
Black, Carbon.....8¢@20¢	
Black, Drop, Amer.....2¢@4¢	
Black, Drop, Eng.....15¢@11¢	
Black, Ivory.....15¢@9¢	
Lamp, Com.....3¢@5¢	
Blue, Celestial.....5¢@8¢	
Blue, Chinese.....35¢@40¢	
Blue, Prussian.....30¢@38¢	
Blue, Ultramarine.....3¢@35¢	
Brown, Spanish.....1¢@1¢	
Brown, Vandyke, Amer.....1¢@2¢	
Brown, Vandyke, Foreign.....9¢@3¢	
Carmine, No. 40.....\$2.15@2.75	
Green, Chrome, ordinary.....5¢@6¢	

Green, Chrome, pure.....18¢@20¢	
Lead, Red, bbls. 1/2 bbls. and kegs: Lots 500 lb or over.....8¢@4¢	
Lots less than 500 lb.....8¢@4¢	
Litharge, bbls. 1/2 bbls. and kegs: Lots 500 lb or over.....6¢@4¢	
Lots less than 500 lb.....6¢@4¢	
Ocher, French Washed.....14¢@2¢	
Ocher, Dutch Washed.....4¢@5¢	
Ocher, American.....\$1.00@15.00	
Orange Mineral, English.....\$1.00@4¢	
Orange Mineral, French.....11¢@11¢	
Orange Mineral, German.....8¢@9¢	
Orange Mineral, American.....8¢@8¢	
Red, Indian, English.....4¢@8¢	
Red, Indian, American.....3¢@3¢	
Red, Turkey, English.....4¢@8¢	
Red, Tuscan, English.....7¢@10¢	
Red, Venetian, Amer.....\$1.00@1.10	
Red, Venetian, English.....1.80@2.10	
Sienna, Italian, Burnt and Powdered.....3¢@9¢	
Sienna, Ital. Raw, Powdered.....3¢@7¢	
Sienna, American, Raw.....1¢@2¢	
Sienna, American, Burnt and Powdered.....1¢@2¢	
Talc, French.....\$1.00@1.25	
Talc, American.....90¢@1.10	
Terra Alba, French.....\$1.00@2.95	
Terra Alba, English.....95¢@1.00	
Terra Alba, American No. 1.....65¢@70¢	
Terra Alba, American No. 2.....45¢@50¢	
Umber, Turkey, Bnt. & Pow.....2¢@3¢	
Umber, Turky, Raw & Powd.....2¢@3¢	
Umber, Bat, Amer.....1¢@2¢	
Umber, Raw, Amer.....1¢@2¢	
Yellow, Chrome.....10¢@25¢	
Vermillion, American Lead.....10¢@25¢	
Vermillion, Quicksilver, bulk.....72¢	
Vermillion, Quicksilver, bags.....73¢	
Vermillion, English, Import.....85¢	
Vermillion, Chinese.....85¢@95¢	
Colors in Oil.	
Black, Lampblack.....10¢@14¢	
Blue, Chinese.....36¢@40¢	
Blue, Prussian.....32¢@36¢	
Blue, Ultramarine.....19¢@16¢	

Brown, Vandyke.....	9¼@12
Green, Chrome.....	8 @12
Green, Paris.....	@21
Sienna, Raw.....	10 @13
Sienna, Burnt.....	10 @13
Umber, Raw.....	9¼@12
Umber, Burnt.....	9¼@12
Miscellaneous.	
Barytes, Foreign, 1 ton....	\$19.00@21.00
Barytes, Amer. doated....	19.00@20.00
Barytes, Crude.....	9.00@10.00
Chalk, in bulk..... 1 ton	2.00@ 2.75
Chalk, in bbls..... 100 b	@ 3.35
China Clay, English..... 1 ton	13.00@17.50
Cobalt, Oxide..... 100 b	2.25@ 3.00
Whiting, Common..... 100 b	4.25 @ 5.00
Whiting, Gliders.....	.54 @ .58
Whiting, extra Gliders'....	.54 @ .58
Putty.	
In bulk.....	\$1.90
In bladders.....	2.40
In cans, 12 b to 25 b.....	3.50
In cans, 1 b to 5 b.....	8.00
Spirits Turpentine.	
In Southern bbls.....	@ 44
In machine bbls.....	@ 44½
Glue.	
Low Grade..... 12	@ 15½
Cabinet.....	13½@18
Medium White.....	14@18
Extra White.....	18 @23
French.....	12 @40
Irish.....	13½@16
Animal, Fish and Vego- table Oils.	
Linseed, City, raw..... 1 gal.	75 370

CURRENT METAL PRICES.

OCTOBER 31, 1900.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from Store—

Common Iron: Duty, Round, 0.6¢ # lb; Square, 0.8¢ # lb	
1 to 1½ in. round and square	1.65@1.75¢
1½ to 4 in. x ½ to 1 in.	1.70@1.80¢
Refined Iron:	
1 to 1½ in. round and square	1.70@1.80¢
1½ to 4 in. x ½ to 1 in.	1.90@2.00¢
1½ to 2½ in. x 3-16 in. and thicker	2.10@2.20¢
Rods—¾ and 1-16 round and square	2.10@2.20¢
Angles:	
3 in. x ½ in. and larger	2.00¢
3 to 3½ in. x 3-16 in.	2.00¢
1½ to 3 in. x ½ in.	2.10¢
1½ to 2½ in. x 3-16 in. and thicker	2.10¢
1 to 1½ in. x 3-16 in.	2.10¢
1 to 1½ in. x 3-16 in.	2.20¢
¾ x ¾ in.	2.50¢
¾ x ¾ in.	2.55¢
¾ x ¾ in.	3.20¢
¾ x ¾ in.	3.70¢
Test:	
1 in.	2.40¢
1½ in.	2.30¢
1½ in. and larger	2.20¢
Beams:	
Channels, 8 in. and larger	2.25¢
Bands—¾ to 3 x 3-16 to No. 8	2.10¢
"Burden's Best" Iron, base price	2.15¢
Burden's "H. B. & S. Iron, base price	2.95¢
"Uster	3.00¢
Norway Bars	4.00¢
Norway Shapes	4.25¢

Merchant Steel from Store—

Bessemer Machinery	1.70 to 1.80¢
Toe Calk, Tire and Sleigh Shoe	2.00@2.50¢
Best Cast Steel, base price in small lots	7½¢
Best Cast Steel Machinery, base price in small lots	6¢

Soft Steel Sheets—

¼ inch	1.85¢	No. 14	2.40¢
8-16 inch	1.90¢	No. 16	2.50¢
No. 8	2.10¢	No. 18	2.80¢
No. 10	2.20¢	No. 20	3.20¢
No. 12	2.30¢	No. 22	3.50¢

Sheet Iron from Store.

Black.

	Common	R. G. Cleaned
No. 14 to 16	2.30¢	3.00¢
No. 18 to 20	2.30¢	3.10¢
No. 22 to 24	2.30¢	3.10¢
No. 25 to 26	2.30¢	3.30¢
No. 27	2.30¢	3.40¢
No. 28	2.30¢	3.50¢

Russia, Planished, &c.

Genuine Russia, according to assortment	10½¢
Patent Planished	10½¢

Galvanized.

	B. R.
No. 10 to 16	10½¢
No. 17 to 21	10½¢
No. 22 to 24	10½¢
No. 25 to 26	10½¢
No. 27	10½¢
No. 28	10½¢
No. 29	10½¢
No. 30	10½¢
30 in. 1½ # lb higher	21¢

Foreign Steel from Store—

Best Cast	15¢
Extra Cast	15¢
Swaged Cast	15¢
Best Double Shear	15¢
Blister, 1st quality	15¢
German Steel, Best	15¢
2d quality	15¢
3d quality	15¢
Sheet Cast Steel, 1st quality	15¢
2d quality	15¢
3d quality	15¢
R. Muesel's "Special"	15¢
" " Annealed	15¢
" " " "	15¢
Hobson's Choice XX Extra Best	15¢
Jessop Self Hardening	15¢
Seamless "Nelson" Steel	15¢
Hobson's "Soho" Special Self-Hardening	15¢

METALS—

Tin—

Duty.—Pigs, Bars and Block. Free.	Per %
Banco, Pigs	30¢
Straits, Pigs	30¢
Straits in Bars	30¢

Tin Plates—

American Charcoal Plates.

Calland Grade:	
IC, 14 x 20	7.50
IX, 14 x 20	9.00
Melyn Grade:	
IC, 14 x 20	7.00
IX, 14 x 20	8.50
Allaway Grade:	
IC, 14 x 20	6.15
IX, 14 x 20	7.25

American Coke Plates—Bessemer—

IC, 14 x 20	5.30
IX, 14 x 20	6.25
IX, 14 x 20	7.50

American Terne Plates—

IC, 20 x 24	10.50
IX, 20 x 24	12.50

Tin Boiler Plates, American—

IX, 14 x 20	11.25
IX, 14 x 20	11.25
IX, 14 x 31	15.50

Copper—

Duty: Pig, Bar and Ingot and Old Copper free

Ingot—

Lake	17½@17¾¢
Ansonia grade Cast Ing.	17@17¼¢

Sheet and Bolt—

January 10, 1900.

Prices, in cents per pound.

Sheet 30 x 60.

	Not wider than	Not longer than	And longer than	64 oz. & over, 50 lb. sheet, 30 x 60 and heavier.	30 oz. to 64 oz., 25 to 50 lb.	24 oz. to 30 oz., 18½ to 25 lb.	16 oz. to 24 oz., 12½ to 18½ lb.	14 oz. and 15 oz., 11 to 12½ lb.	12 oz. and 13 oz., 9½ to 11 lb.	10 oz. and 11 oz., 7½ to 9½ lb.	8 oz. and 9 oz., 6½ to 7½ lb.	Lighter than 8 oz.
Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
30	72	96	120	144	168	192	216	240	264	288	312	336
36	84	108	144	180	216	252	288	324	360	396	432	468
42	96	120	168	216	272	328	384	440	496	552	608	664
48	108	144	192	240	288	336	384	432	480	528	576	624
54	120	168	216	272	328	384	440	496	552	608	664	720
60	132	180	240	288	336	384	432	480	528	576	624	672
66	144	192	272	328	384	440	496	552	608	664	720	776
72	156	216	304	360	416	472	528	584	640	696	752	808
78	168	232	336	392	448	504	560	616	672	728	784	840
84	180	252	368	424	480	536	592	648	704	760	816	872
90	192	272	400	456	512	568	624	680	736	792	848	904
96	204	288	432	488	544	600	656	712	768	824	880	936
102	216	304	464	520	576	632	688	744	800	856	912	968
108	228	320	496	552	608	664	720	776	832	888	944	1000
114	240	336	528	584	640	696	752	808	864	920	976	1032
120	252	352	560	616	672	728	784	840	896	952	1008	1064
126	264	368	592	648	704	760	816	872	928	984	1040	1096
132	276	384	624	680	736	792	848	904	960	1016	1072	1128
138	288	400	656	712	768	824	880	936	992	1048	1104	1160
144	300	416	688	744	800	856	912	968	1024	1080	1136	1192
150	312	432	720	776	832	888	944	1000	1056	1112	1168	1224
156	324	448	752	808	864	920	976	1032	1088	1144	1200	1256
162	336	464	784	840	896	952	1008	1064	1120	1176	1232	1288
168	348	480	816	872	928	984	1040	1096	1152	1208	1264	1320
174	360	496	848	904	960	1016	1072	1128	1184	1240	1296	1352
180	372	512	880	936	992	1048	1104	1160	1216	1272	1328	1384
186	384	528	912	968	1024	1080	1136	1192	1248	1304	1360	1416
192	396	544	944	1000	1056	1112	1168	1224	1280	1336	1392	1448
198	408	560	976	1032	1088	1144	1200	1256	1312	1368	1424	1480
204	420	576	1008	1064	1120	1176	1232	1288	1344	1400	1456	1512
210	432	592	1040	1096	1152	1208	1264	1320	1376	1432	1488	1544
216	444	608	1072	1128	1184	1240	1296	1352	1408	1464	1520	1576
222	456	624	1104	1160	1216	1272	1328	1384	1440	1496	1552	1608
228	468	640	1136	1192	1248	1304	1360	1416	1472	1528	1584	1640
234	480	656	1168	1224	1280	1336	1392	1448	1504	1560	1616	1672
240	492	672	1200	1260	1312	1368	1424	1480	1536	1592	1648	1704
246	504	688	1232	1296	1344	1400	1456	1512	1568	1624	1680	1736
252	516	704	1264	1328	1376	1432	1488	1544	1600	1656	1712	1768
258	528	720	1296	1360	1408	1464	1520	1576	1632	1688	1744	1800
264	540	736	1328	1392	1440	1496	1552	1608	1664	1720	1776	1832
270	552	752	1360	1424	1472	1528	1584	1640	1696	1752	1808	1864
276	564	768	1392	1456	1504	1560	1616	1672	1728	1784	1840	1896
282	576	784	1424	1488	1536	1592	1648	1704	1760	1816	1872	1928
288	588	800	1456	1520	1568	1624	1680	1736	1792	1848	1904	1960
294	600	816	1488	1552	1600	1656	1712	1768	1824	1880	1936	1992
300	612	832	1520	1584	1632	1688	1744	1800	1856	1912	1968	2024
306	624	848	1552	1616	1664	1720	1776	1832	1888	1944	2000	2056
312	636	864	1584	1648	1696	1752	1808	1864	1920	1976	2032	2088
318	648	880	1616	1680	1728	1784	1840	1896	1952	2008	2064	2120
324	660	896	1648	1712	1760	1816	1872	1928	1984	2040	2096	2152
330	672	912	1680	1744	1792	1848	1904	1960	2016	2072	2128	2184
336	684	928	1712	1776	1824	1880	1936	1992	2048	2104	2160	2216
342	696	944	1744	1808	1856	1912	1968	2024	2080	2136	2192	2248
348	708	960	1776	1840	1888	1944	2000	2056	2112	2168	2224	2280
354	720	976	1808	1872	1920	1976	2032	2088	2144	2200	2256	2312
360	732	992	1840	1904	1952	2008	2064	2120	2176	2232	2288	2344
366	744	1008	1872	1936	1984	2040	2096	2152	2208	2264	2320	2376
372	756	1024	1904	1968	2016	2072	2128	2184	2240	2296	2352	2408
378	768	1040	1936	2000	2048	2104	2160	2216	2272	2328	2384	2440
384	780	1056	1968	2032	2080	2136	2192	2248	2304	2360	2416	2472
390	792	1072	2000	2064	2112	2168	2224	2280	2336	2392	2448	2504
396	804	1088	2032	2096	2144	2200	2256	2312	2368	2424	2480	2536
402	816	1104	2064	2128	2176	2232	2288	2344	2400	2456	2512	2568
408	828	1120	2096	2160	2208	2264	2320	2376	2432	2488	2544	2600
414	840	1136	2128	2192	2240	2296	2352	2408	2464	2520	2576	2632
420	852	1152	2160	2224	2272	2328	2384	2440	2496	2552	2608	2664
426	864	1168	2192	2256	2304	2360	2416	2472	2528	2584	2640	2696
432	876	1184	2224	2288	2336	2392	2448	2504	2560	2616	2672	2728
438	888	1200	2256	2320	2368	2424	2480	2536	2592	2648	2704	2760
444	900	1216	2288	2352	2400	2456	2512	2568	2624	2680	2736	2792
450	912	1232	2320	2384	2432	2488	2544	2600	2656	2712	2768	2824
456	924	1248	2352	2416	2464	2520	2576	2632	2688	2744	2800	2856
462	936	1264	2384	2448	2496	2552	2608	2664	2720	2776	2832	2888
468	948	1280	2416	2480	2528	2584	2640	2696	2752	2808	2864	2920
474	960	1296	2448	2512	2560	2616	2672	2728	2784	2840	2896	2952
480	972	1312	2480	2544	2592	2648	2704	2760	2816	2872	2928	2984
486	984	1328	2512	2576	2624	2680	2736	2792	2848	2904	2960	3016
492	996	1344	2544	2608	2656	2712	2768	2824	2880	2936	2992	3048
498	1008	1360	2576	2640	2688	2744	2800	2856	2912	2968	3024	3080
504	1020	1376	2608	2672	2720	2776	2832	2888	2944	3000	3056	3112
510	1032	1392	2640	2704	2752	2808	2864	2920	2976	3032	3088	3144
516	1044	1408	2672	2736	2784	2840	2896	2952	3008	3064	3120	3176
522	1056	1424	2704	2768	2816	2872	2928	2984	3040	3096	3152	3208
528	1068	1440	2736	2800	2848	2904	2960	3016	3072	3128	3184	3240
534	1080	1456	2768	2832	2880	2936	2992	3048	3104	3160	3216	3272
540	1092	1472	2800	2864	2912	2968	3024	3080	3136	3192	3248	3304
546	1104	1488	2832	2896	2944	3000	3056	3112	3168	3224	3280	3336
552	1116	1504	2864	2928	2976	3032	3088	3144	3200	3256	3312	3368
558	1128	1520	2896	2960	3008	3064	3120	3176	3232	3288	3344	3400
564	1140	1536	2928	2992	3040	3096	3152	3208	3264	3320	3376	3432
570	1152	1552	2960	3024	3072	3128	3184	3240	3296	3352	3408	3464
576	1164	1568	2992	3056	3104	3160	3216	3272	3328	3384	3440	3496
582	1176	1584	3024	3088	3136	3192	3248	3304	3360	3416	3472	3528
588	1188	1600	3056	3120	3168	3224	3280	3336	3392	3448	3504	3560
594	1200	1616	3088	3152	3200	3256	3312	3368	3424	3480	3536	3592
600	1212	1632	3120	3184	3232	3288	3344	3400	3456	3512	3568	3624
606	1224	1648	3152	3216	3264	3320	3376	3432	3488	3544	3600	3656
612	1236	1664	3184	3248	3296	3352	3408	3464	3520	3576	3632	3688
618	1248	1680	3216	3280	3328	3384	3440	3496	3552	3608	3664	3720
624	1260	1696	3248	3312	3360	3416	3472	3528	3584	3640	3696	3752
630	1272	1712	3280	3344	3392	3448	3504	3560	3616	3672	3728	3784
636	1284	1728	3312	3376	3424	3480	3536	3592	3648	3704	3760	3816
642	1296	1744	3344	3408	3456	3512	3568	3624	3680	3736	3792	3848
648	1308	1760	3376	3440	3488	3544						



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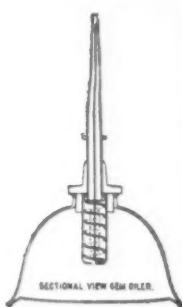
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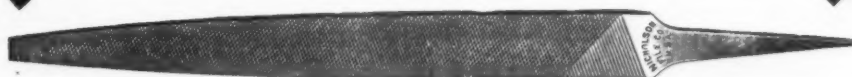
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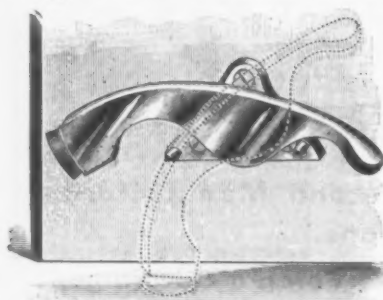
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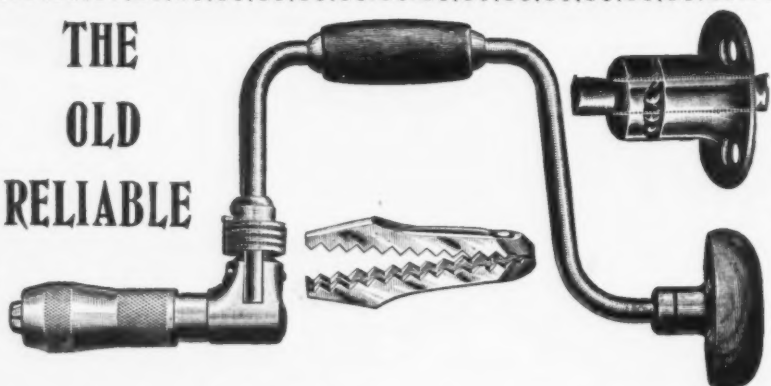
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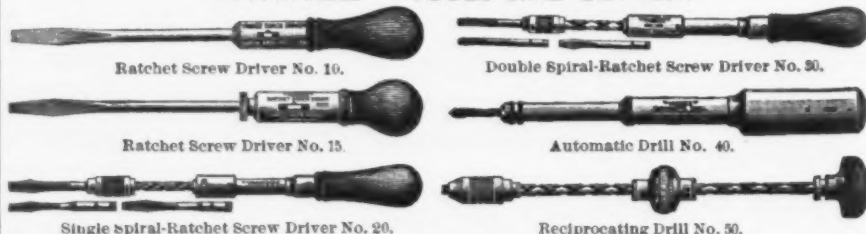
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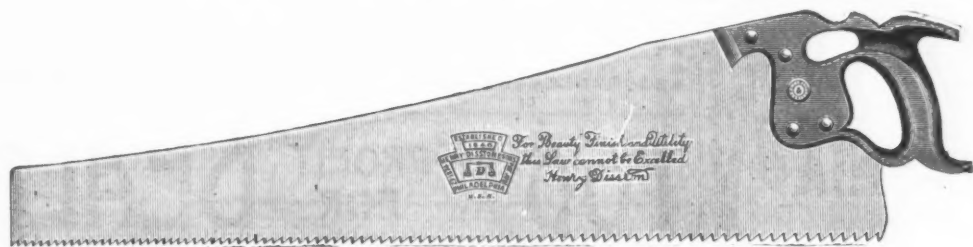
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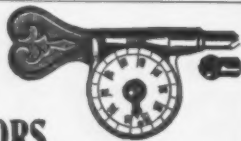
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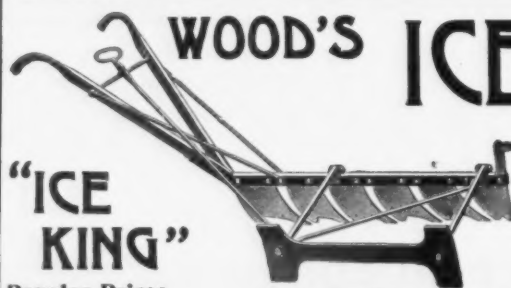
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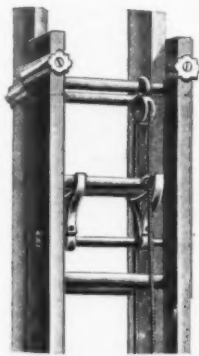
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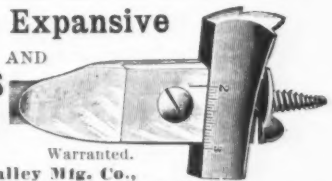
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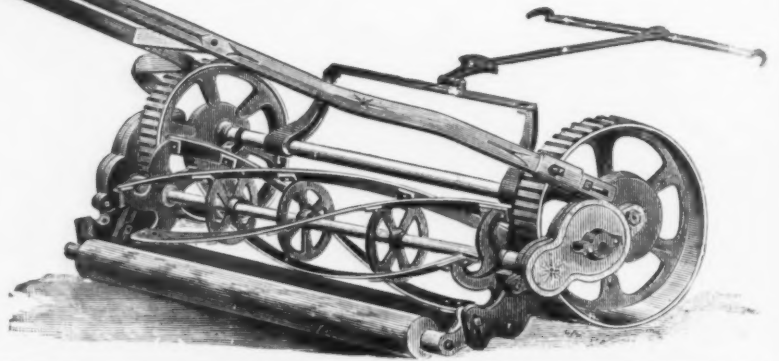
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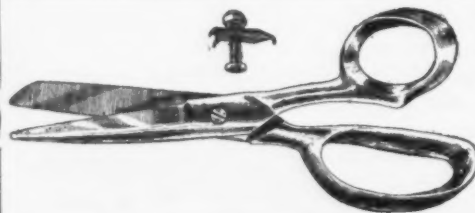
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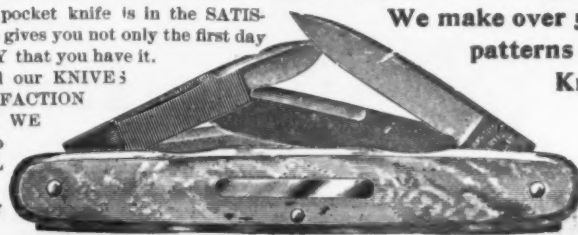
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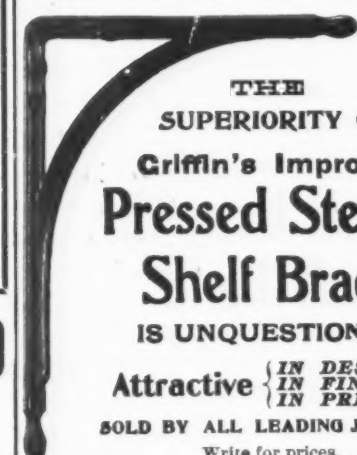
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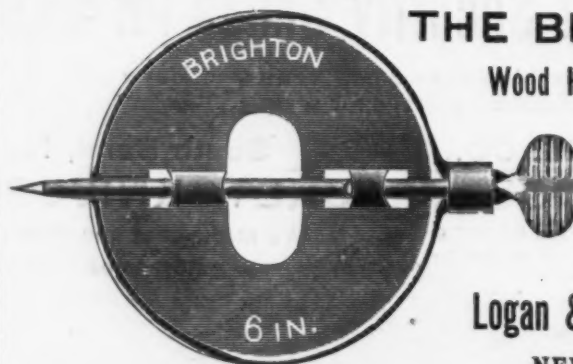
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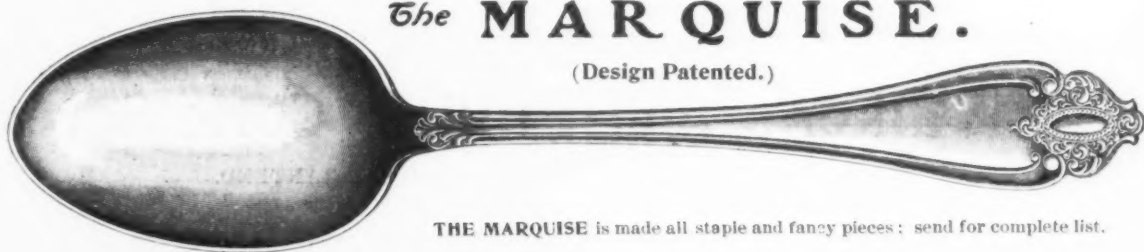
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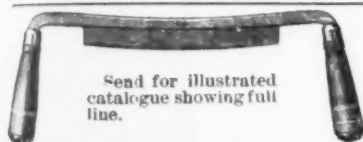
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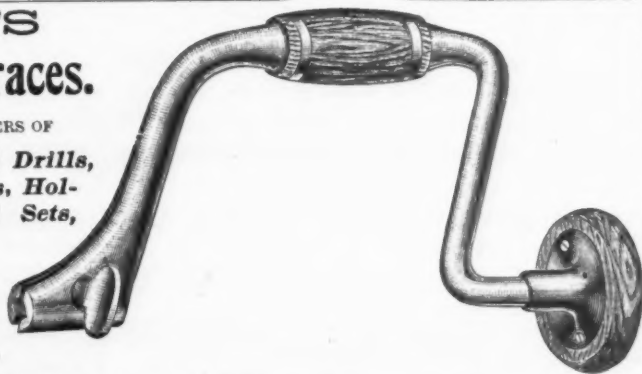
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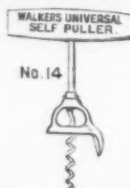
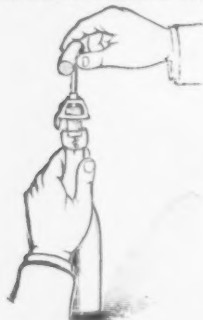
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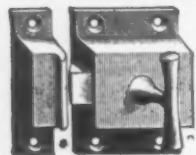
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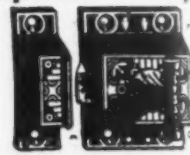
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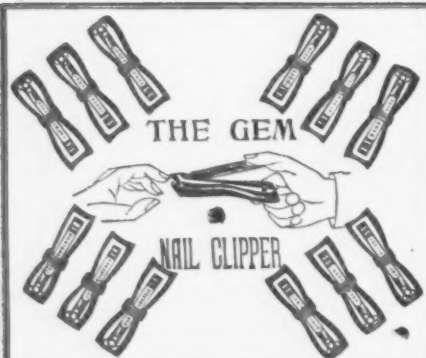
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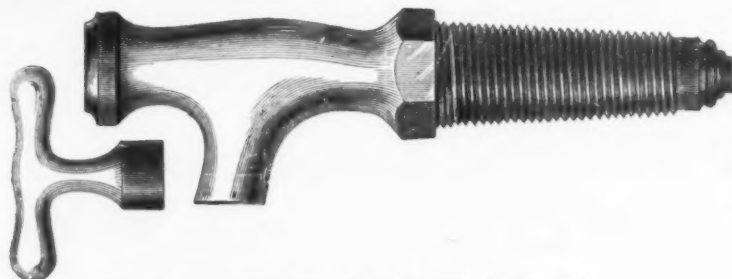


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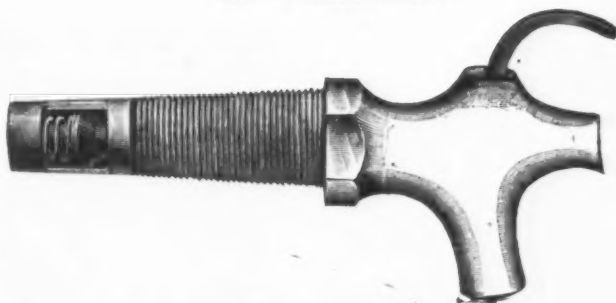
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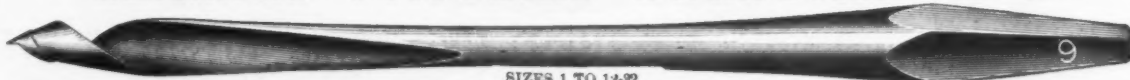


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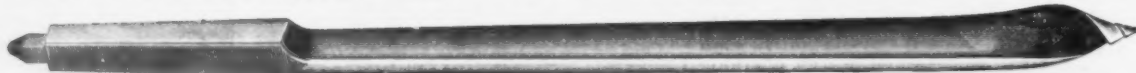


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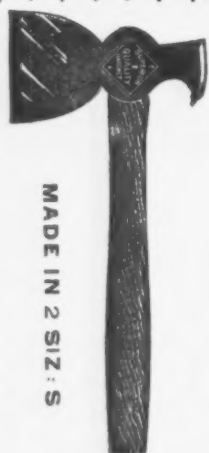
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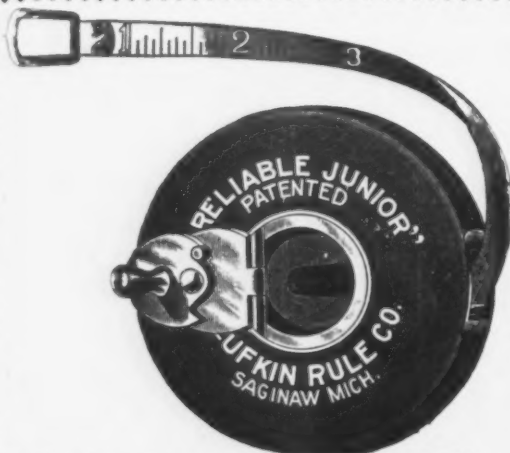
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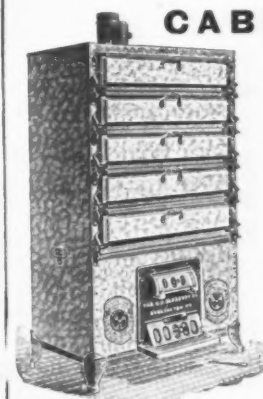


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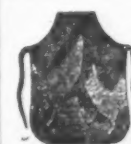
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Beautiful, safe light. Five hours' service of 100 candle power light costs one cent. Free catalog of various designs.

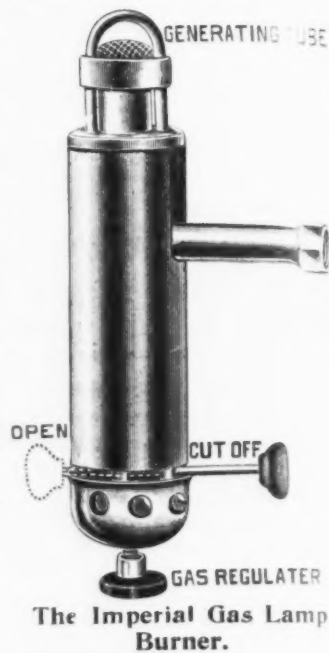
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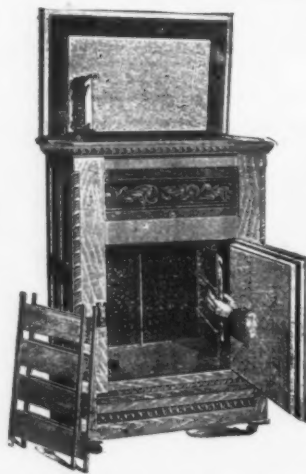
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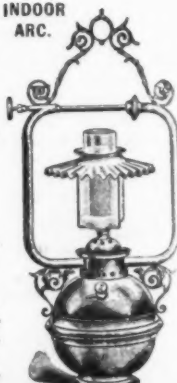
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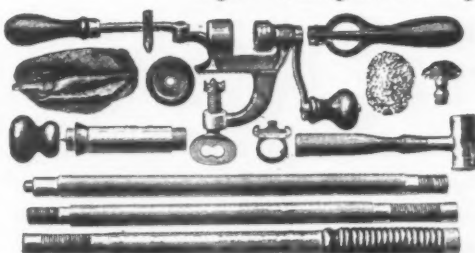


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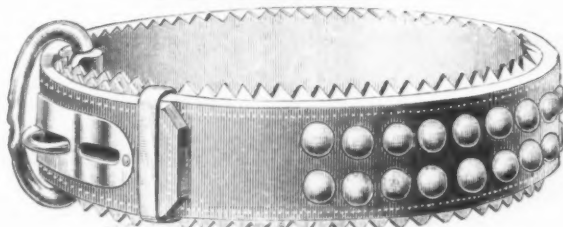
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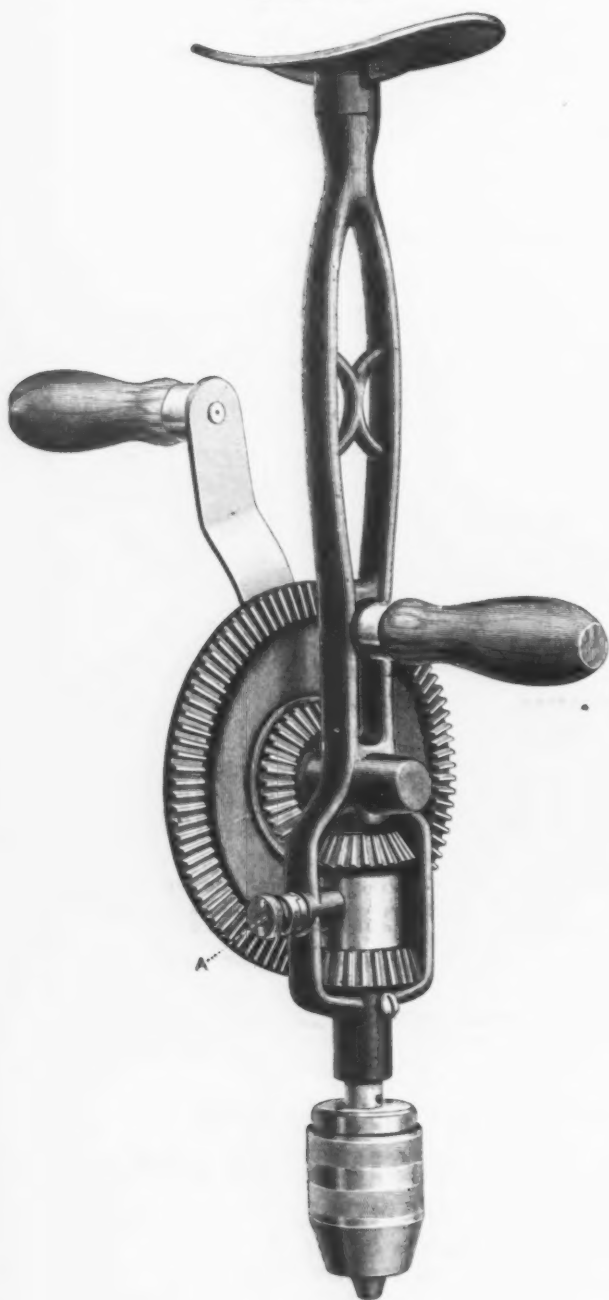


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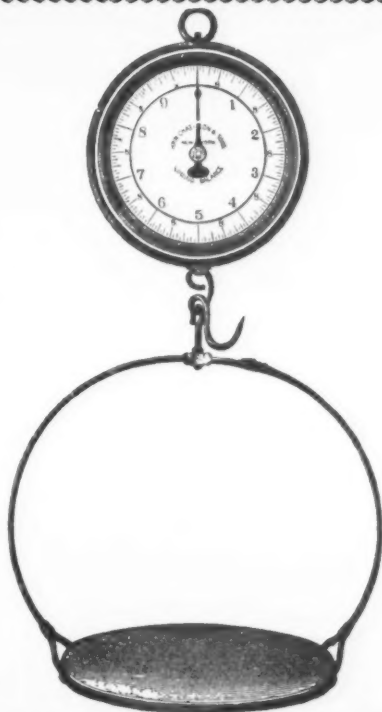
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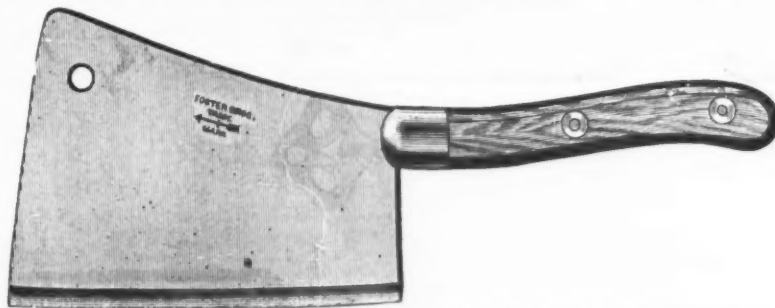
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FOSTER BROS.' BUTCHER KNIVES, CLEAVERS, STEELS, &c.



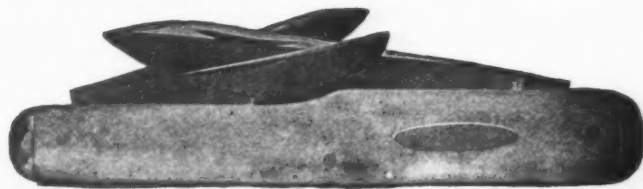
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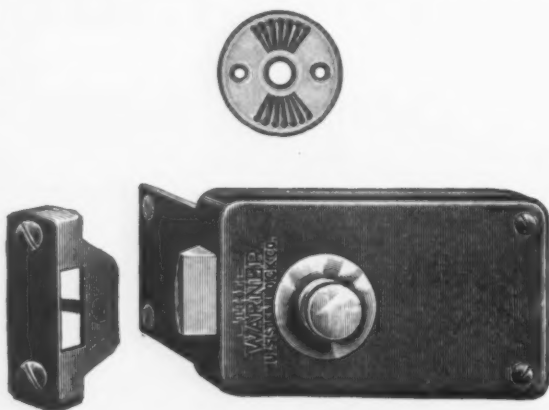
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No. 200 SERIES.

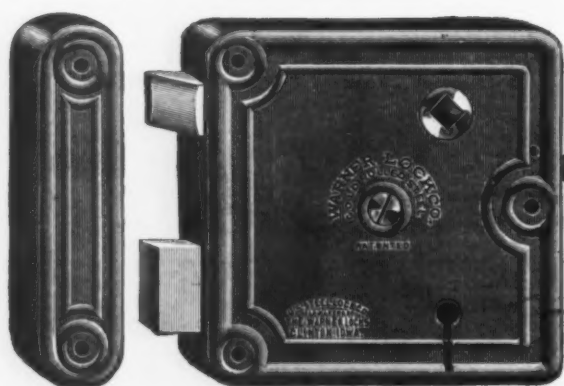
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No.	Finish.	Bolt.	Two Keys No. 52.	Knob.	Escutcheon.
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The "Warner" Iron Bolt Rim Knob Lock.

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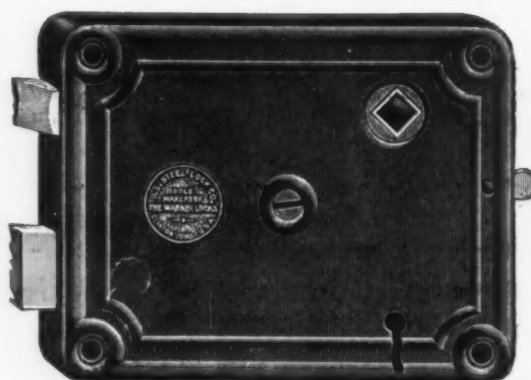
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New Horizontal Rim Lock.

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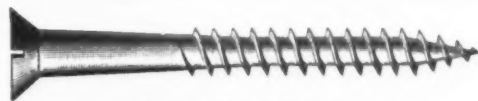
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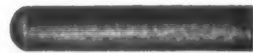
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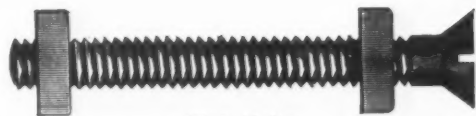
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CROSS-CUT SAWS

At International Sawing
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*"Read what the Secretary of the
Association says about it."*



From the *"Australasian Ironmonger,"* Sept., 1900.

INTERNATIONAL AXE and SAW COMPETITIONS—The annual meeting of The Australasian Axemen's Association was held at Sprent, Tasmania, on July 21. The annual report and balance-sheet was submitted by Mr. H. A. Nichols, Secretary. The paragraph of most interest to our readers contains the following, referring to the saw competitions:

"The Gold Medal for Saws was contested for by only the three great American firms, ———, ———, and E. C. Atkins & Co., and the Atkins saws scored a meritorious victory, the ——— being second. The correctness of this decision has come out in a **marked degree** during the months since the sports, for the Atkins saws used in the contest, having been distributed among **professional** sawyers, have won splendid **unsolicited testimonials** for their cutting powers and all-round quality."

TWO GOLD MEDALS

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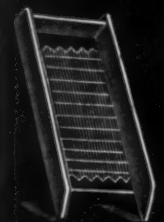
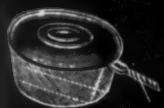
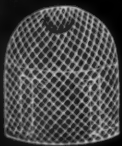
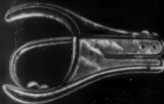
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Brackets.
Brushes, Steel Casting.
Brooms, Steel Stable and Street.
Barrel Covers.
Baskets, Wire display
Baskets, Coke, Fish and Potato.
Boilers, Vegetable and Egg
Bread Toasters.
Broilers and Toasters.
Bowl Strainers.
Brass Wire Fire Guards.
Brass and Copper Wire Cloth
Baskets, Moss or Hanging.
Baskets, Waste Paper.
Baskets, Sponge.
Bank and Counter Railings.
Bank Counter Wickets.
Box Stall Guards.



Cages, Bird, Squirrel and Parrot.
Clothes Lines, Galvanized.
Conductor's Punches.
Cattle Punches.
Cover Sink Strainers.
Corn Poppers.
Coffee Strainers.
Coffee Pot Stands.
Cloth, Steel and Brass.
Chairs, Iron.
Chairs, Wire.
Counter Protector.
Cars, Elevator.
Counter Railings.
Cages, for Bank and Stores.
Currency Guard.
Cresting, Roof.

Dish Covers, Round.
Dish Covers, Oval.
Display Baskets.
Dog Muzzles.
Dippers, Egg and Vegetable.



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Dover Egg Beaters.
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Egg Beaters.
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Elevator Metal Cars.

Foundry Riddles.
Fish Trap.
Fly Traps.
Fire Guards.
Fenders, Nursery.
Flower Bed Border.
Flower Stands.
Floor Railing.
Fence Wire.
Finials, Galvanized.
Finial, for Roof Cresting.

Gas Burner Protectors.
Grave Guards.
Grills.
Guard Railing, Brass.
Gates, Iron.
Gates, Drive.

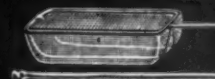
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Horse Muzzles.
Hair Wire, Spooled.
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Hat Stands.
Hay Racks.

Iron Vases.
Iron Stall Partitions.
Iron Railings.

Jeweler's Guards.

Lamp Chimney Cleaner.
Lawn Chairs.

Mouse Traps.
Muzzles, Horse.
Meat Rests or Broilers.
Milk Jar Carriers.
Mashers, Potato.



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Nests, Hens.
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Oyster and Clam Rack.
Office and Partition Railing.
Office Rail, Brass.

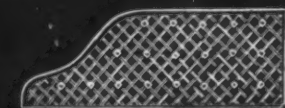
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Paper Files.
Plant Covers.
Poultry Coops.
Punches, Conductor's.
Punches, Ticket.
Punch Designs.
Punch, Cattle.
Punches, Leather.
Poppers, Corn.
Potato Mashers.

Pot Stands, Wire, Flower.
Paper or Sponge Baskets.
Partition or Office Railings.
Panels, Brass or Steel.
Partition, Stall.

Riddles, Regular Iron.
Riddles, Miner's, Coal.
Riddles, Steel and Brass.
Foundry.

Revolving Coal and Coke Screen.
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Railing, Cast Iron.

Squirrel Cages.
Springs, Cage.
Sifters, Hunter's.
Sieves, Wood Rim.
Sieves, Tin Rim.
Sifters, Champion.



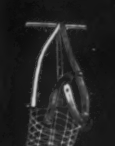
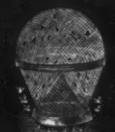
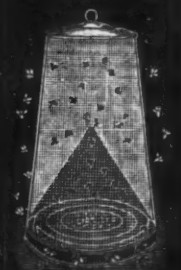
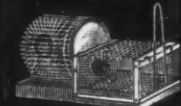
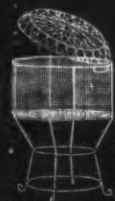
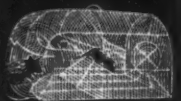
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Screens, Coal.
Screens, Revolving.
Steel Casting Brushes.
Stable and Street Brooms.
Spiral Flue Brushes.
Spooled Hair Wire.
Spark Guards.
Stove Guards.
Settees, Iron.
Settees, Wire.
Show Case Stands.
Signs, Wire.
Skylight Guards.
Store Guards and Gates.
Scroll Borders for Counter Railings.
Stall Partitions.
Stable Fittings.

Tea and Coffee Strainers.
Tea and Coffee Pot Stands.
Tree Guards.
Trainer, Flower.
Trainers, Umbrella.
Trainers, Arch.
Trellises.
Turnstile and Railing.

Umbrella Stands.

Vegetable or Egg Boilers.
Vegetable Dippers.

Wash Stand.
Wire Cloth, Iron or Steel.
Wire Cloth, Galvanized.
Wire Cloth, Steel Bolting.
Wire Cloth, Mining.
Wire Cloth, Brass and Copper.
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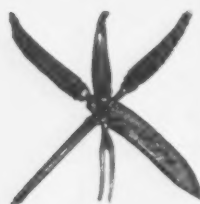
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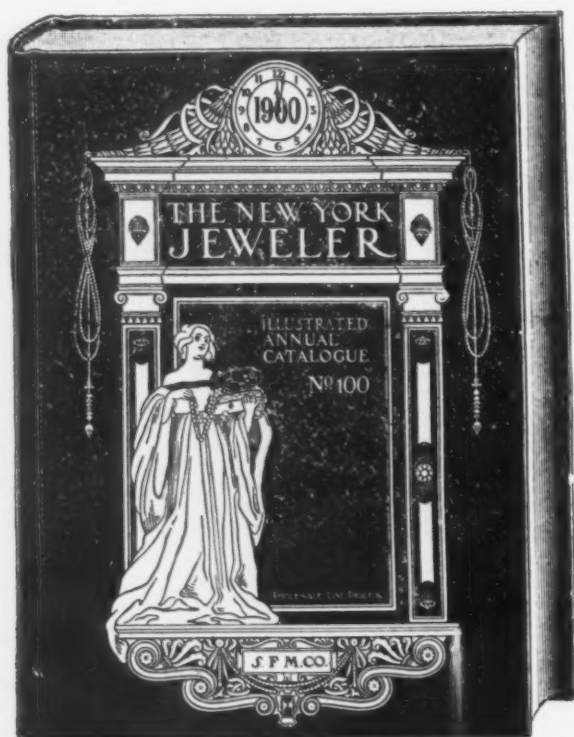
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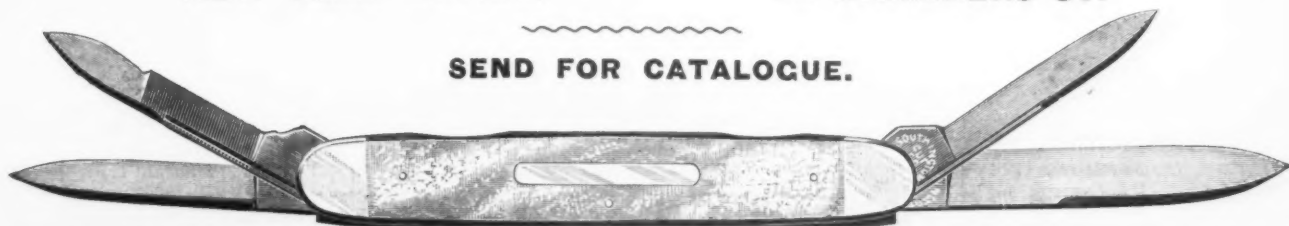


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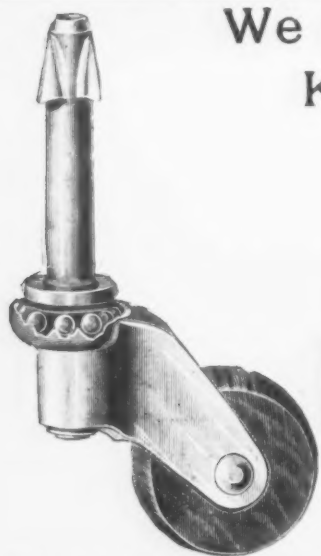
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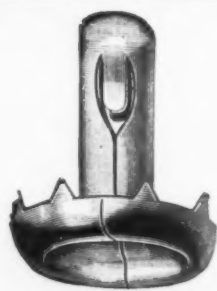


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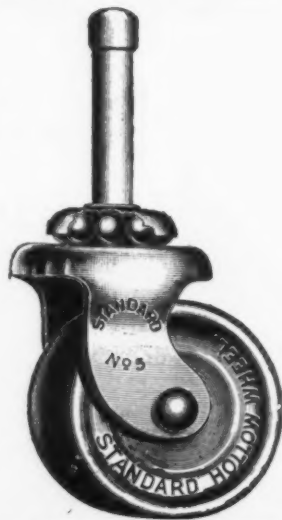


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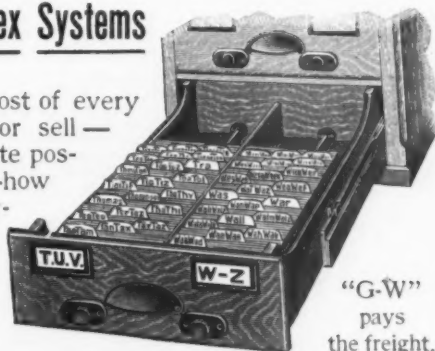
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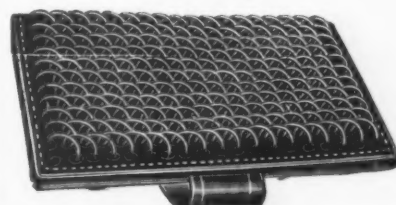


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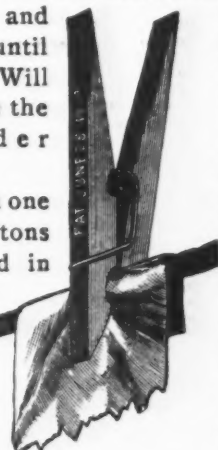
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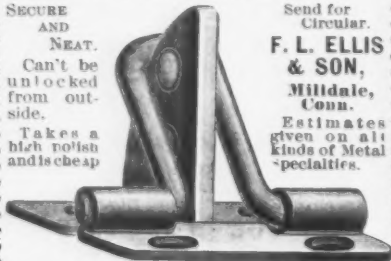
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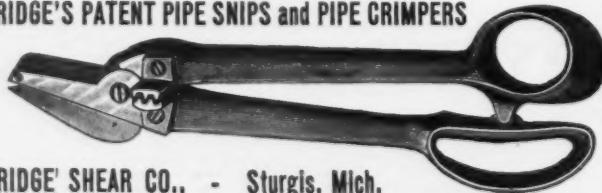


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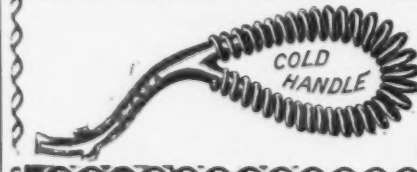
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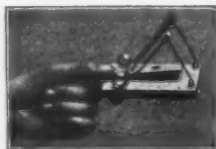
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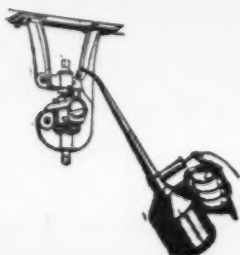
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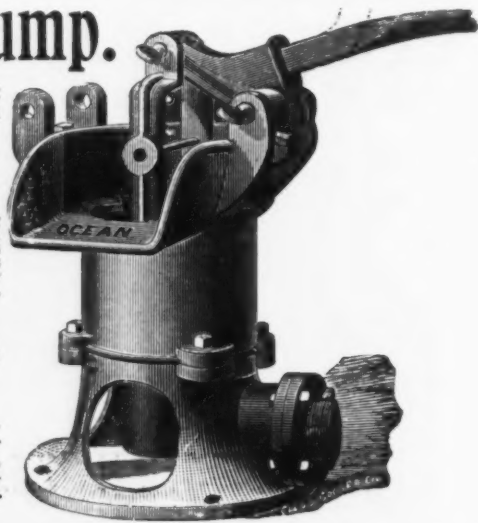


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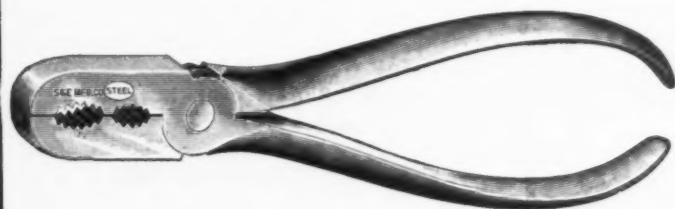
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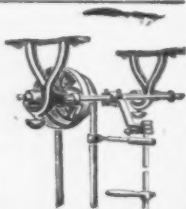
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SAVES time to the manu-
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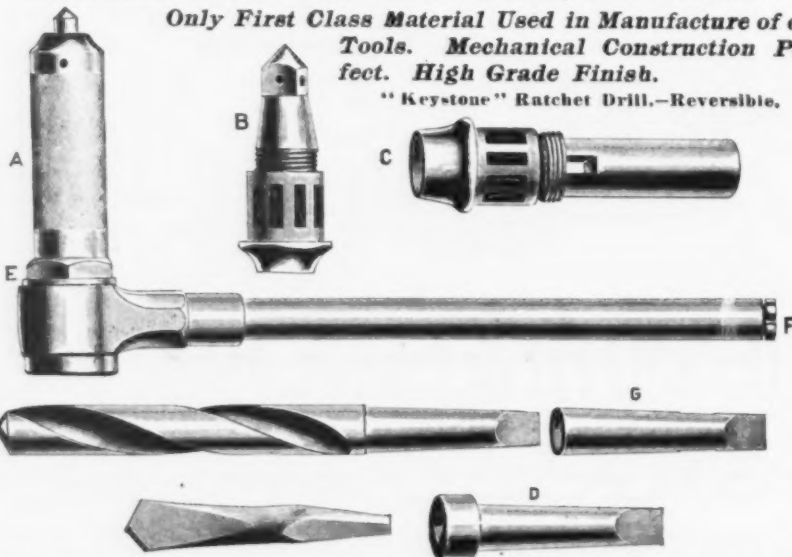


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The illustration shows Ratchet Drill, adjusted, for square shank drills; cut "A" also other parts for drilling purposes, all parts being interchangeable in holder; cut "C" represents socket for Morse taper shank drills, and cut "D" is a sleeve fitted to Morse taper socket and in which square shank drills may be used. Cut "B" represents Boiler Makers' Drill for square shank; the feed screw is made from the best tool steel, hardened.

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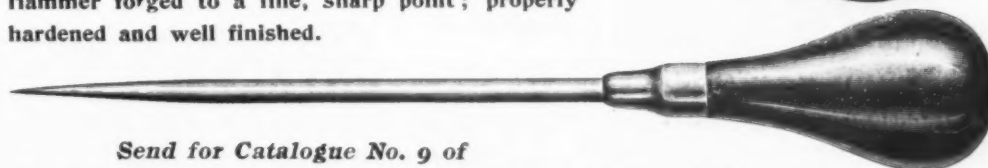
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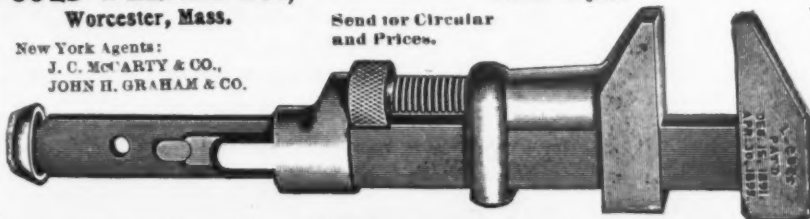
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Our Scratch Awls are made from Tool Steel.
Hammer forged to a fine, sharp point; properly
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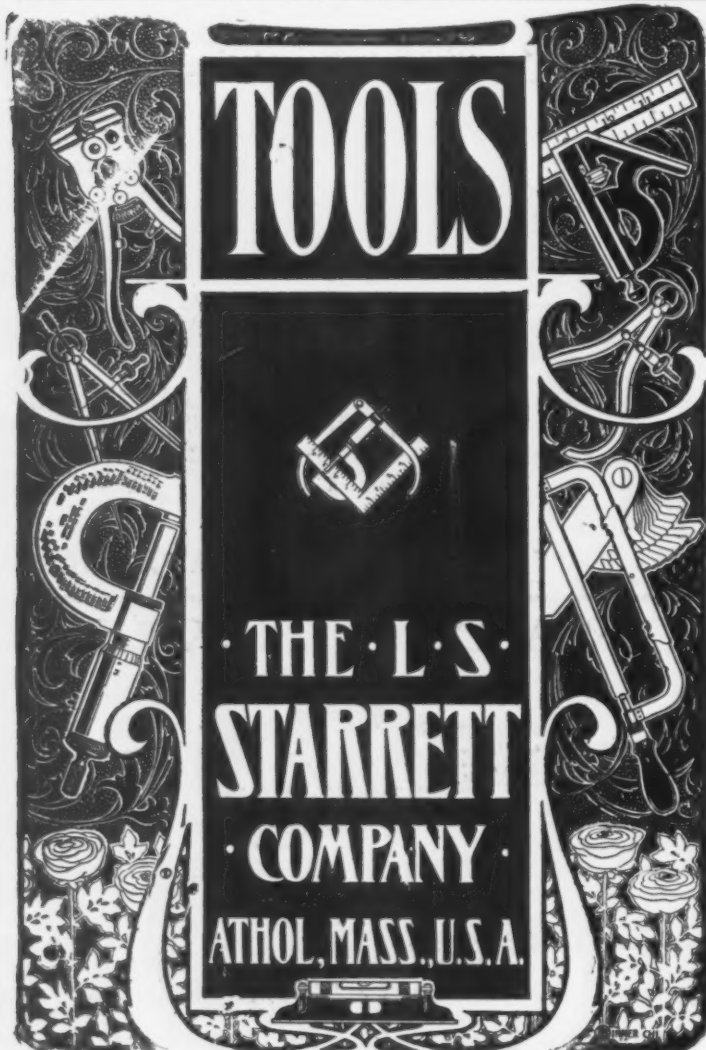
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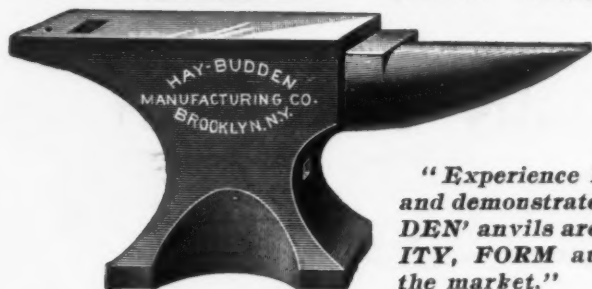


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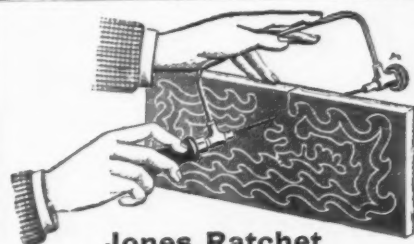
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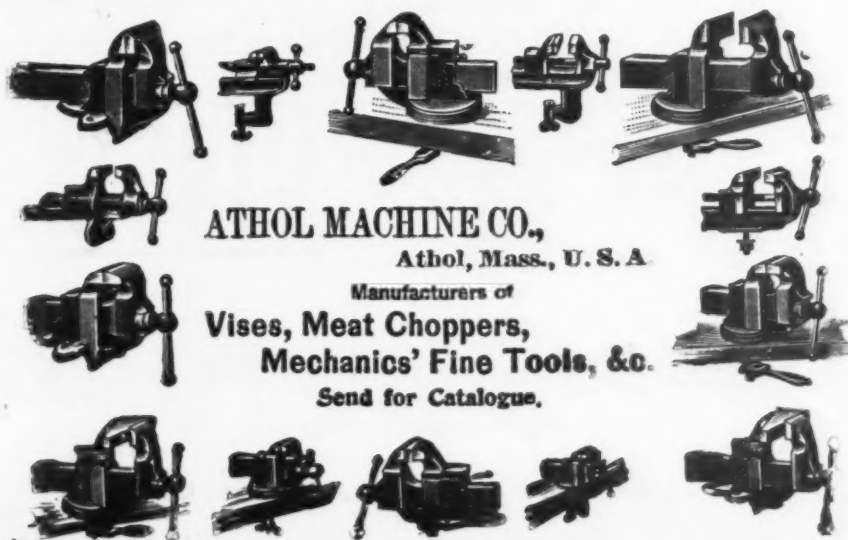


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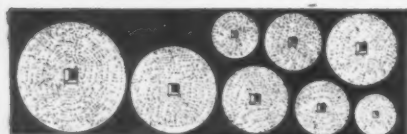
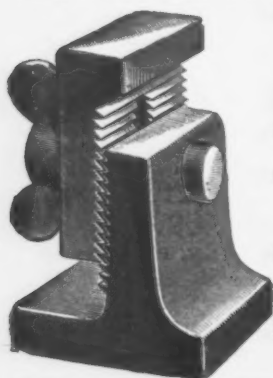
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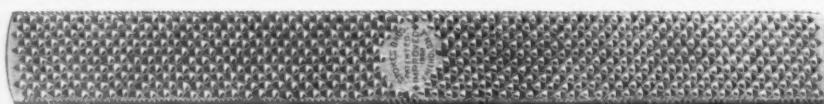
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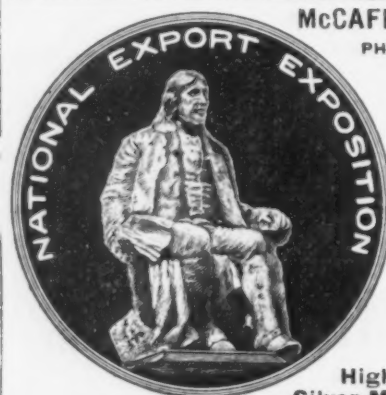
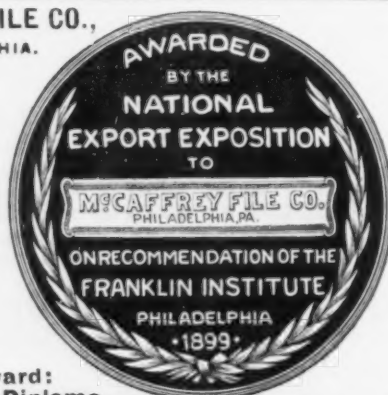
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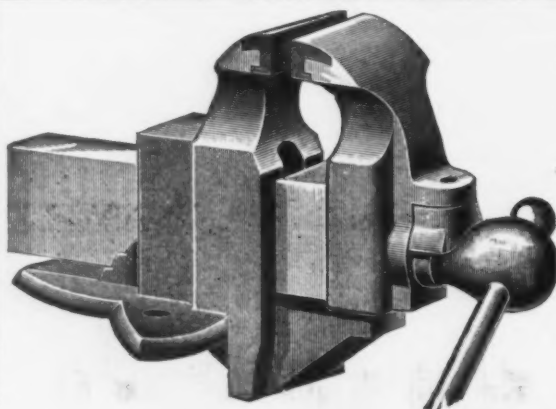
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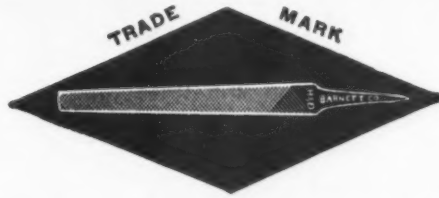
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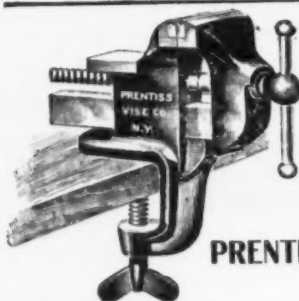


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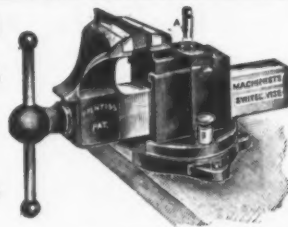
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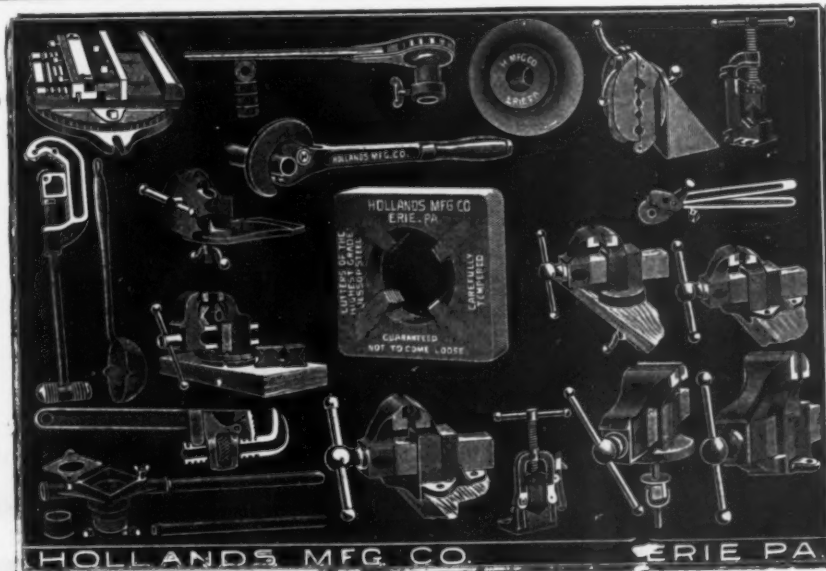
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Commence to draw as soon as lever
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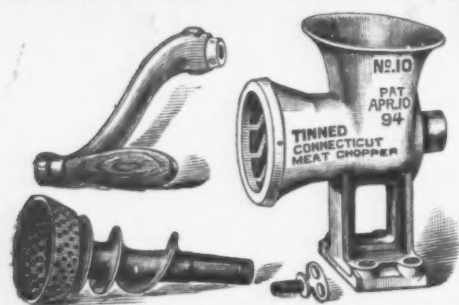
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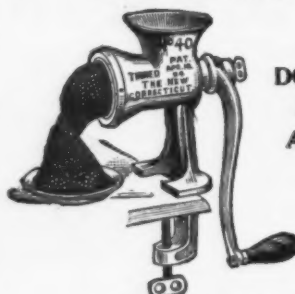
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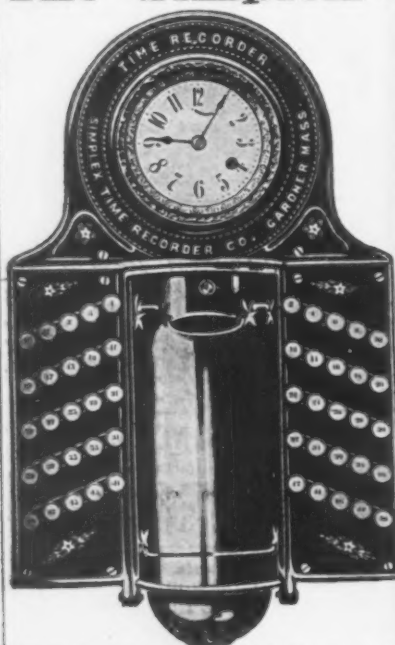
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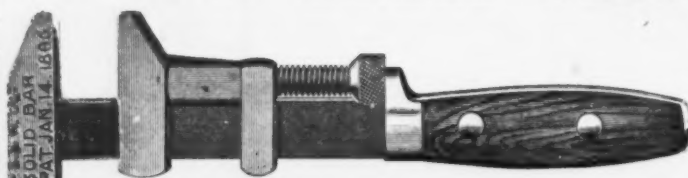
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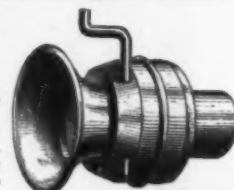
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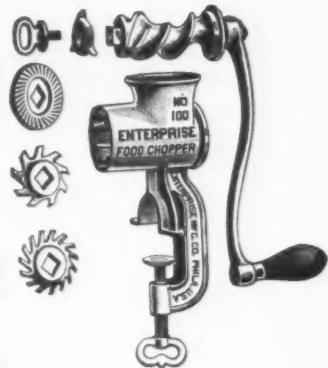
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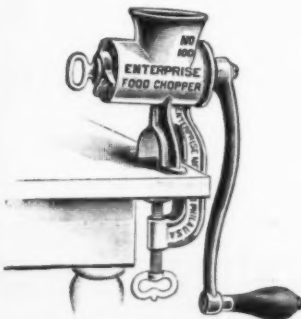
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The Enterprise Mfg. Co. of Pa.
Philadelphia, Pa., U. S. A.

New York Branch, 10 Warren St.

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Gray Flint Enameled Ware

Manufactured by

KEEN & HAGERTY MFG. CO.,

Main Office and Salesroom, 16 West Baltimore St., Baltimore, Md.

New York Salesroom, 31 Cliff Street.

Chicago Salesroom, 1115 Chamber of Commerce.

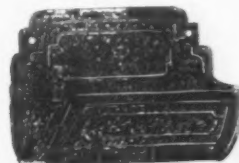
Philadelphia Salesroom, 116 Market Street.

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We make all descriptions of Pieced,
Heavy Polished, Stamped, Japanned
and Gray Flint Enamelled Ware.



Write for Illustrated Catalogue, No. 42,
showing FULL LINE



The Sterling Chopper

AND

The Sterling Slicer.

TWO UNEQUALED KITCHEN TOOLS.

Have you seen the slicer? It's just out.



N. R. STREETER & CO.,

ROCHESTER, N. Y.



Is unquestionably the best machine of its kind ever offered to the public. It will cut without crushing raw or cooked meat, sea food, fruit, vegetables, etc., into coarse or fine pieces, according to the cutter used, of which three accompany each chopper.

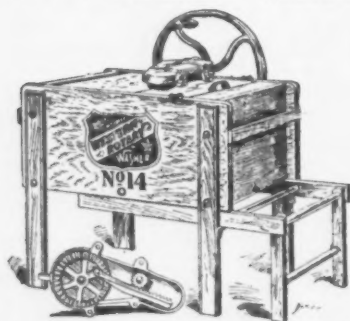
It has eliminated all the objectionable features of other choppers and has added several improvements that are distinctly its own. It is always in order and the knives require no sharpening.

An additional and exclusive feature of the **Star Food Chopper** is a plate hinged at the top of the hopper which, when pressed on the food to be cut, forces it upon the feed screw, thus preventing the possibility of injuring or soiling the fingers, which is liable to occur in using other choppers.

For sale by all dealers.

CHAS. D. BROWN, Sole Agent,
460 Duane Street, New York City.

THE NEW WESTERN ROTARY WASHER.



No complicated gearing to get out of order or broken. Simply one large pinion fastened on the shell or cover; one small pinion attached to the post; another small pinion meshing in the large one attached to shaft, and the Rack Bar; that's all. Washer operates right or left, the large hand wheel is attached to side of tub, does not have to be lifted with the cover; when latter is down it is always ready for business.

THE ANTHONY WAYNE MFG. CO.,
Ft. Wayne, Ind.



... THE ...

Buckeye Washing Machine.

THE LATEST AND BEST.

Is constructed on scientific principles, giving it the largest amount of rubbing surface for less labor than any other washer on the market.

HAS NO EQUAL.

Simple in Construction—Easy to Operate—Reasonable in Price.

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BUCKEYE CHURN CO.,
Sidney, O., U. S. A.

Aluminum Oil Heaters.

235,000 IN USE.

NOVELTY MANUFACTURING CO.,
Jackson, Mich., U. S. A.



Gas Heating Stoves. Gas Specialties.

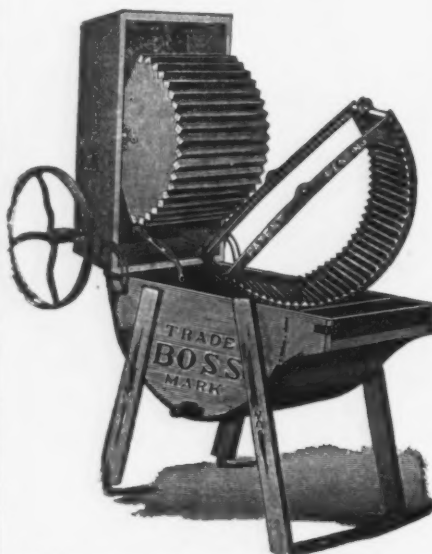
The best heaters on the market.
Biggest stock and greatest variety of any house in the country.
New Catalog E for the asking.

REINEKE, WILSON CO.,

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TRADE-MARK



"BOSS" WASHING MACHINE With Steel Frame Cylinder

Allowing 2 1/4 inch more space for clothes, giving a better circulation of water through the clothes, thereby cleansing them more thoroughly than by any other washer.

Order sample and see for yourself the superior advantages embodied in

THE "BOSS"

over any other. By handling the improved "BOSS" WASHING you will have the only genuine and best ever made. For complete description and prices send for Circular "A."

Address the manufacturers.

**BOSS
WASHING MACHINE CO.,**
308-318 Pearl St.,
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TAPLIN'S IMPROVED DOVER EGG BEATERS.

THE BEST
EGG BEATERS MADE.

SEND FOR PRICES.

THE TAPLIN MFG. CO., - 90 Chambers Street, New York.



Notice
That
Fearing.

Blue Flame Oil Cook Stoves

WICK
AND
WICKLESS.

In seven different styles. Low, medium and high, which for durability, simplicity, economy and convenience, are in all respects the best made.

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THE DANGLER STOVE & MFG. CO.
CLEVELAND, OHIO, U. S. A.



FOR

**AUTOMOBILES,
LIGHT CARRIAGES,
BIKE WAGONS, ETC.**



YOUR JOBBER HANDLES IT.
(If he does not, write us and send us his name.)

SNOW FLAKE AXLE GREASE CO.,

3 Sudbury Street, Boston, Mass., U. S. A.

T. W. GILBERT & CO., 108 N. Third Street, Philadelphia, Pa.,
Distributing Agents for Penn., Del., N. J. and Md.

Send for "FACTS BOILED DOWN" and Prices.

Parker's

Ball-Bearing, Rapid-Grinding

COFFEE, DRUG

and

SPICE MILLS.

Large Variety of Styles
and Sizes.

Send for New Catalogue.



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VISES**

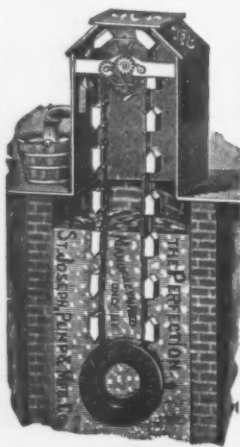
and a Large Line of Hardware
Specialties.

The Charles Parker Co.,

MERIDEN, CONN.,

and 82 Warren St., New York.

You know that



the bulk of water for drinking purposes is consumed during the summer months. Sell your trade a

WATER PURIFIER,

something that sets water a-sparkling with fresh air every time the wheel goes round. First-class Hardware, Pump and Implement Jobbers all know a good thing and handle the

"Perfection" Bucket Pump

Write for sample outfit to-day. Catalog free.

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The Virginia Rotary Washing Machine.



Patented Nov. 31, 1890.

Easy Running. Simple. Made of Selected Virginia White Cedar. Welded Wire Hoops. The Dolly adjusts itself to the amount of clothes in the washer.

Richmond Cedar Works,
Manufacturers of Wooden Ware,
RICHMOND, VA.

WHITE MOUNTAIN FREEZER

Quickest Freezing

Best Results

Economical Durable

The Standard of Excellence Everywhere.
SOLD BY ALL LEADING JOBBERS.
SEND FOR CATALOGUE.

THE WHITE MOUNTAIN FREEZER CO.,
NASHUA, N. H.



THE LARGEST LINE OF Ice Tools and Lemon Squeezers

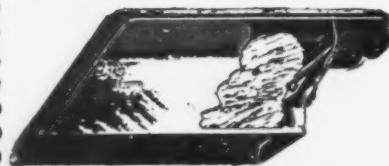
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A. C. WILLIAMS,
RAVENNA, OHIO, U. S. A.,

To whom send for catalogue of House Furnishing Specialties and Hardware.

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Export Sales Agents.



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Tea or Coffee Pot Stand, one piece of wire, retinned.



TOWEL RACK.
HAS NO EQUAL.

Manufacturers of Woven Wire Hammocks, Steel Hat Racks. Wire Door Mats, etc.

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SOWERBY BRIDGE, YORKSHIRE, ENGLAND.



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SWINGING ARCH and REMOVABLE CYLINDER.

ESPECIALLY CONVENIENT FOR LARD PRESSING.

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Steel Goods.

Door Hangers,
Door Track and Stay Rollers,
Door Hinges and Butts,
Felloe Plates and Washers,
Warehouse Trucks and Specialties.

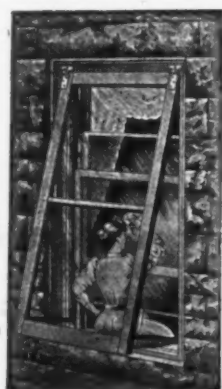
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SASH WEIGHTS, IRON and LEAD,

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CINCINNATI, O.

Ventilators, Valve Stop Boxes, Hydrant Boxes, Meter Boxes,
Washers, Special Sizes Iron and Lead Weights to Order,
and all Kinds of Castings.



The PHENIX HANGER

Solves the Problem HOW TO
HANG Storm Windows and
Entire Screens. ❖ ❖ ❖

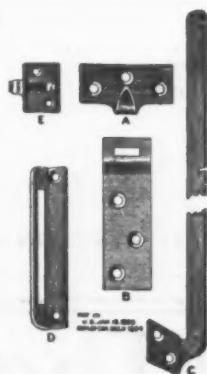
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FOR CLEAN WINDOWS.

Ideal Ventilation. No Flies. Solid Comfort.

Storm Windows and Screens are hung or
removed with ease from inside at any time,
by any person. Sold by all Hardware Deal-
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PHENIX MANUFACTURING CO.,
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THE OGDEN

Automatically Regulated

Liquid Door Check and Spring.



Easily Applied.

Positively Regulated.

Refilled Without Removing.

Cannot Leak.

The ONLY Check that FULLY controls the Door.

FULL DESCRIPTIVE CATALOGUE.

APPLY TO

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IT WORKS BOTH WAYS



NEW IDEA Double-Acting Spring Hinge.

Closes the door without violent oscillation.
Door cannot sag.

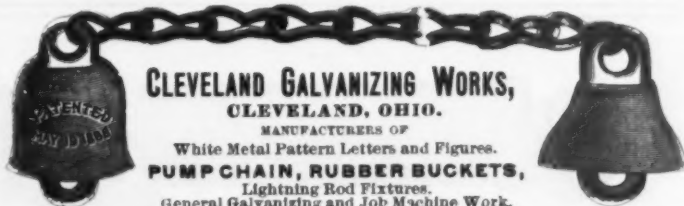
Holds door in perfect alignment when closed.

Concave jamb plate. Corners of door need
not be rounded off. Easily put on.

Made in variety of sizes, patterns and finishes.
No other hinge so good.

Our Art Catalogue of Builders' Hardware is
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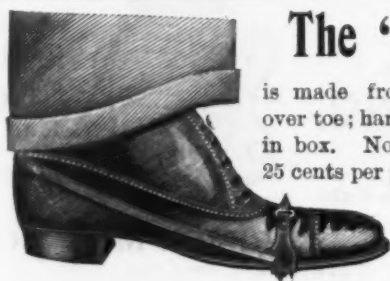
MANUFACTURERS OF

White Metal Pattern Letters and Figures.

PUMP CHAIN, RUBBER BUCKETS,

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General Galvanizing and Job Machine Work.



The "ALASKA" Ice Creeper

is made from Best Leather, has adjustable straps
over toe; hard steel spikes in sole. Put up one doz. pair
in box. No. 100 for men, No. 98 for ladies. Retail for
25 cents per pair. For sale by leading jobbers or send to

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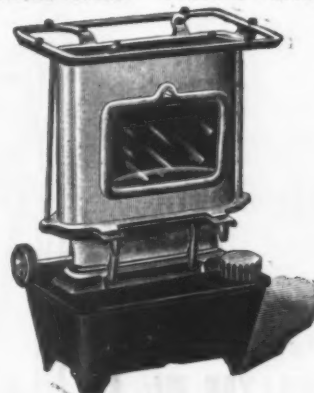
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LAMP STOVES

FOR EXPORT.

LARGE LINES. SPECIAL PRICES.



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TRADE MARK
CSB CO
A BUSINESS RUDDER

Our trade-mark is a never failing rudder, steering to success the hardware dealers who handle our line of goods.

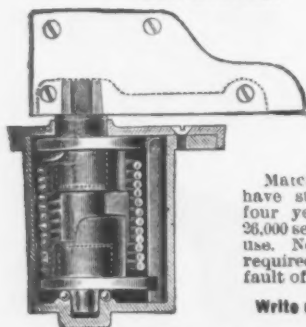
We are manufacturers of Spring Hinges, Door Springs, Door Pulls, Kick or Push Plates, House Numbers, Barn Door Hangers, etc.

We ship promptly and exactly as ordered. Catalogue free.

CHICAGO SPRING BUTT CO.,
Chicago. New York.

CHARLES AUGUST HATLEY M. N.

THE MATCHLESS
Double - Acting Floor Hinge.
Ball Bearing.



Matchless Hinges have stood the test four years. Nearly 26,000 sets are now in use. Not one set has required repairs from fault of hinge.

Write us for prices.

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MAIN OFFICE,

Chicago. Milwaukee, Wisconsin New York

The Lyon is the Best
Egg Beater and
Cream Whip
IN THE WORLD.
INFRINGEMENT
NOTICE.

Patent of Sept. 7, 1897, grants me the exclusive right to make a single or

DOUBLE
PROPELLER
Egg Beater.

All dealers are warned against purchasing any imitations of my Beater.

NELSON LYON, Mfr.,
52 Green St.,
ALBANY, N. Y.



Norwalk Lock Company

MANUFACTURERS OF

Locks and Builders' Hardware
of all descriptions and finishes.

DESIGNERS AND WORKERS OF

Artistic House Trimmings
in Bronze, Brass, and Iron.

FACTORY AND HOME OFFICE,

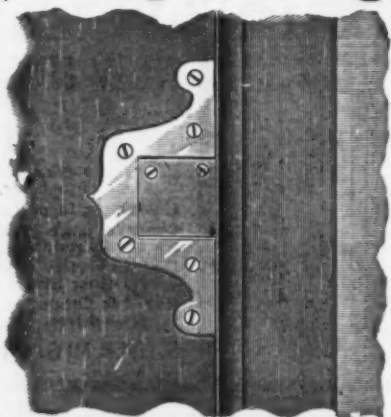
SOUTH NORWALK, CONN.

NEW YORK, BOSTON, PHILADELPHIA, BALTIMORE,
23 Warren St. 113 Congress St. 507-509 Commerce St. 32 Hopkins Place.

The Easy Spring Hinge

Equalizes the pressure at all points, permitting the door to return to its initial point, slowly and easily. This is a radical departure from all other similar constructions. The door once adjusted is always in line. There are no unsightly springs or parts visible. There's no sagging of the door possible, and many other good features embodied in the "EASY" which will commend themselves upon examination. Write for descriptive matter.

SHELBY SPRING HINGE CO.,
Shelby, Ohio.



LARIMER



AUTOMATIC
DOOR CHECK
AND SPRING.

Simple, Durable,
Noiseless, Ornamental
and the Price is Right.

Office and Factory:
LATROBE, PA.

Manufactured by
LARIMER MFG. CO.

Chicago Office: 68 NORTH STATE ST., J. B. OTTO, Mgr.
New York Representative, LEWIS D. BOGGS, 23 Warren St.
New England Agents, HARDWARE AGENCY CO., 36 Pearl St., Boston.

Suitable
for all
Classes
of
Doors.



CATALOGUES.

- No. 1, GENERAL.
- No. 2, REGISTERS.
- No. 3, RAILROAD HANGERS.
- No. 4, WIRE WORKERS' GOODS.
- No. 5, HANGERS AND RAIL.
- No. 6, MALLEABLE HARDWARE.

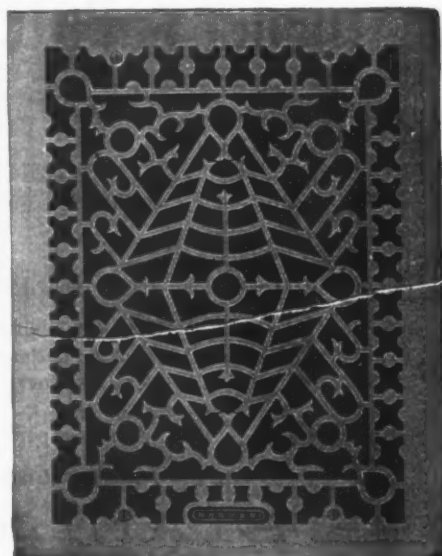
STOWELL'S

Hot Air
Registers

ARE

STANDARD
GOODS.

All Sizes in Stock.

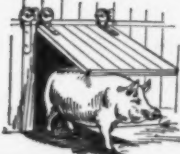


HAVE YOU SEEN OUR NEW CATALOGUE?

It has much information on DOOR HANGERS and how to buy them. You can have one by the asking, and our prices too.

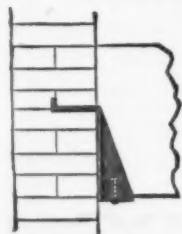
WILCOX MFG. CO., - - - AURORA, ILL.

THE MYERS "Stayon" Flexible Door Hanger,



With steel roller bearings, easy to push and to pull, cannot be thrown off the track—hence its name—"Stayon."
Mechanically perfect yet simple in construction. 3 1/4 inch wheels. Track of double strength of others and reversible. Each door can be raised or shoved outward independent of the other, or held rigid as desired—an especial feature in the "Stayon" hanger.
Write for descriptive circular and prices. Exclusive agency given to right parties who will buy in quantity.
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ARE YOU BUILDING?



Don't weaken the Joists or Headers or Walls by cutting into them. Use hangers. We make all sizes.

Send for Hanger List.



THE W. J. CLARK CO., Salem, Ohio.

REGIS-
TERS
and
VENTI-
LATORS.
NOT IN
COMBIN-
ATION.

Send for
Prices.

Folding Lunch Box

Japanned and Ornamented.
Made in Two Sizes.
Send for Trade Discount.

SEAVEY MFG. CO., Boston, Mass.



"NEVER-BREAK." Best Finished Goods Made.
SOMETHING NEW. WE HAVE IT.

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MARKS
ALLOWED.

SKATES FOR CHILDREN.

PATENTS
APPLIED
FOR.

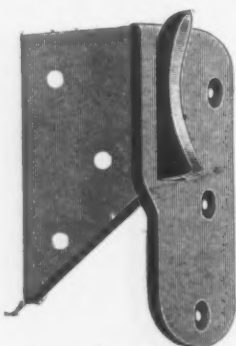
WRITE TO US FOR PRICES, ETC.

THE AVERY STAMPING CO., Cleveland, Ohio, U. S. A.

J. C. McCARTY & CO., 10 Warren St., New York Representatives.

Schroeder's Patent Hangers and Fasteners

For Storm Sash and Screens.



Invisible Hanger.



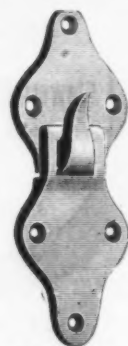
Schroeder's Patent Fastener. 10 inches Long.

Made from Wrought Steel. Light and Strong.

With these hangers storm sash can be very easily and quickly put up or taken down *without the aid of ladder, nails, screws or tools* of any kind.

The fastener permits the sash to be swung out for ventilation or cleaning.

The most perfect device made for hanging storm sash and screens.



Visible Hanger.

FOR SALE BY LEADING JOBBERS. SEND FOR CIRCULARS.

THE STANLEY WORKS,

New Britain, Conn.
79 Chambers St., N. Y.

The Lawrence Common Strap and T Hinges.



ORDERS SOLICITED.
PRICES ARE RIGHT.

Manufacturers of Steel Door Hangers, Hinges, Pulleys, and other Hardware Specialties.

LAWRENCE BROS., Sterling, Ill.

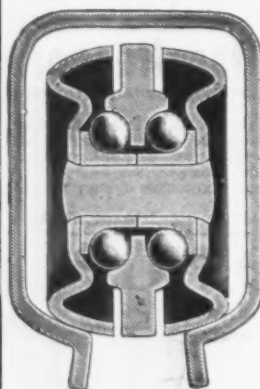
The Walda Sectional Window Weight.



Square and Round Weights Hang exactly from centre Only 10 inch pockets required. Eliminates use of lead weight.

The Hardware Dealer

with one-sixth the stock required in one piece weights can fill any order Weight crated with 100 lbs. in a box, both plainly marked.



To secure the best device on the market for hanging sliding doors, order the McCabe Ball-Bearing Door Hanger. Write for catalogue and prices. The McCabe Hanger Mfg. Co., 540 W. 22d Street, New York.

The Contractor

saves time, money and delay by balancing windows exactly at once.

SEND FOR CIRCULAR.

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E. E. BROWN & CO.,

McKean and Meadow Sts.,

PHILADELPHIA, - - PA.

United States Steel Lock Co.,
CLINTON, IOWA,

SOLE MAKERS

WARNER LOCKS.

LOCKS.

HARDWARE.

Cold Rolled Steel.
Accurate in Construction.
Unsurpassed in Quality.

Artistic in Design.
Elegant in Finish.
Moderate in Price.

Lane's Steel Jack.



**NO WOOD.
NO CAST METAL.**

Easily sold and each customer brings another.

**FOUR SIZES.
FINISH BLACK OR GALVANIZED.**

LANE BROTHERS CO.,

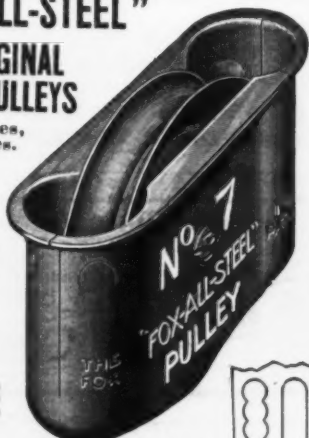
MANUFACTURERS,
Prospect and River Sts.,
POUGHKEEPSIE, N. Y.

"FOX-ALL-STEEL"

**THE ORIGINAL
STEEL PULLEYS**

Two Styles,
Two Sizes.

**LIGHT
STRONG
NOISE-
LESS
DURABLE**



2 1/2 in. Wheel, for EITHER a FOUR HOLE
OF STRAIGHT SIDE MACHINE MORTISE.
ADAPTED TO ANY ONE'S USE.

Write for our **SAMPLE PULLEYS FREE.**
Catalogue and
FOX MACHINE CO, 195 No. Front St.,
Grand Rapids, Mich

Palmer's Common Sense Frame Pulley.



Each pulley its own
Marking Gauge
ALL HAVE STEEL AXLES

MANUFACTURED BY

PALMER HARDWARE MFG. CO.,
TROY, N. Y.

**SILVER LAKE
SASH CORD**
Has been the standard for thirty years.

MANUFACTURED
BY THE
SILVER LAKE CO.
BOSTON.

Every Hank Bears the Above Label.
SEND FOR SAMPLE.

THE "BARDSLEY"
Oil Door Check and Spring

HAS new and improved features; is free from packing friction; the checking power can be released when the door is near the closing point; more oil can be added when needed without taking it from the door and it can be readily taken apart with the aid of a screw-driver when repairs are necessary.

Size A,	price each,	\$3 50
" B,	" "	4 00
" C,	" "	5 00
" D,	" "	6 00
" E,	" "	7 00

LIBERAL DISCOUNTS TO THE TRADE.
JOS. BARDSLEY,
147 to 151 Baxter St., NEW YORK CITY.

Pullman Sash Balance Co.,
MAKERS
OF THE
**"Pullman"
Hardware
Specialties**

MAIN OFFICE AND WORKS,
Rochester, N. Y., U. S. A.

No Screws,
No Nails.
Use a hammer and a common punch or nail set.

Method of fastening the
GRAND RAPIDS ALL STEEL SASH PULLEYS.
Save Freight, Save Time, Save Money. Samples Free.
GRAND RAPIDS HARDWARE CO.,
21 Pearl St., Grand Rapids, Mich.

HALT!
HARDWARE DEALERS
CAN RECOMMEND
**MORTON'S BRONZE AND STEEL
CABLE SASH CHAINS**
As the best substitute for sash cords ever made. Some in daily use over 25 years. These chains are easily applied to any window. Will run equally as well on either round or square groove pulleys.

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THOMAS MORTON.
65 Elizabeth Street,
NEW YORK.

**TOOL HANDLES.
INK STANDS.**
Wood Turnings.
Send for Prices.
Frederick W. Sillman, Chester, Conn.

**The 1900
Peerless STEAM COOKER**
Guaranteed superior to any other and more value for the money. Cooks entire meal on one burner. Saves half fuel bill. Prevents bad odors in the house. Whistles for more water. We make other novelties. See our New Egg Boiler and Steam Coffee Pot. send for circular.
Peerless Cooker Co., Buffalo, N.Y.

**BIGELOW
WIRE FLY KILLER.**
The original and up-to-date Fly Killer on the market. It has no equal. Flies cannot escape it. Will not crush, soil or mar the most delicate wall paper or ceiling.
A Quick Seller. Good Profits.
Trade sample on application
J. F. BIGELOW, Mgr.,
Worcester, Mass.
Patented Jan. 8, 1896.

EGG BEATERS.
We make the largest line in the world. Send for samples and prices.
STANDARD CO.,
107 Haverhill St.,
Boston, U. S. A.

MARLIN

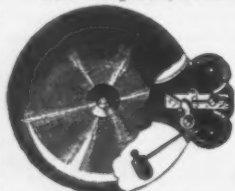


IN these days of smokeless powders and high pressures why take chances on filling your face with powder, losing your eyesight and possibly your life by using a repeater that opens on top and ejects into your face, when you can avoid the possibility by buying a MARLIN? The Solid Top Frame and Side Ejecting principle is the most important improvement made in repeating arms for many years. Complete illustrated catalog for 3 stamps.

THE MARLIN FIRE ARMS CO.
NEW HAVEN, CONN.

THE GONG BELL MFG. CO.

E. Hampton, Conn., U. S. A.



ABBE'S
and
YANKEE
PATENT
GONG
DOOR BELLS

Globe and silver Chime Bells, Table Call Bells, Bicycle Bells, Signal Trip Gongs, Automobile Bells, etc.

ESTABLISHED 1866.

Send for Catalogue and Prices.

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Bells

of all descriptions:
also BICYCLE
SPECIALTIES.

Established in 1838.

AUTOMOBILE BELL.

Bevin Bros. Mfg. Co.,
EAST HAMPTON, CONN.



IF YOU SHOOT A RIFLE.
Pistol or Shotgun, you'll make a Bull's Eye by sending three 2c stamps for the Ideal Hand-Book, 126 pages FREE. The latest Encyclopedia of Arms, Powders, Shot and Bullets. Mention Iron Age. Address IDEAL MFG. CO., New Haven, Conn., U. S. A.



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With
Rotary
Movement
and Non-
Revolving
Gongs.
Best on
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Send for Catalogue
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N. N. HILL BRASS CO., EAST HAMPTON, CONN.

TRAP SHOOTING



Remington
HAMMERLESS
GUNS

A CATALOGUE WILL BE
SENT ON APPLICATION



Remington Arms Co. ILION NEW YORK

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We work all kinds of Sheet Metal in all
kinds of shapes.

METAL STAMPINGS.

Send Sample or Drawings
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STAMPING CO.,

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Worcester, Mass.

THE RIFLE EVENT OF THE YEAR.



The National Rifle Association and the New Jersey State Rifle Association Tournament, which is held each year at Sea Girt, N. J., has become the great rifle contest of the world and at these ranges the rifle experts meet each year to test their skill. This year there were many teams from the various Military Organizations, both the Regulars and the National Guards of the different States, besides other well-known Rifle Organizations. The first large prize contested for was the famous Wimbledon Cup, a magnificent silver piece valued at \$350.00. It was presented by the British Rifle Association a number of years ago and is shot for each year on the 1,000-yard range; this being the greatest test of skill and ammunition. Two years ago it was won by Lieut. F. C. Wilson of Georgia, using King's Semi-Smokeless Powder; this year it was won by W. D. Faulk of Philadelphia, also using Semi-Smokeless.

Peters Cartridges, loaded with King's Semi-Smokeless, won eight of the large prizes as follows:

Wimbledon Cup, Schuetzen Match, Interstate Military Match, Interstate Regimental Team Match, All Corners Military Match, New Jersey Rifle Association Trophy Match, Winchester Match, Revolver Re-entry Match, Revolver Team Match.

The results of this tournament show most conclusively the superior qualities of King's Semi-Smokeless as a Rifle and Pistol Powder, and shows that the 45-70-500 Springfield Rifle is by no means a "back number" when accuracy is demanded.

The Peters Cartridge Co. is loading Semi-Smokeless in all their metallic cartridges, thus placing the best of ammunition in the hands of sportsmen without any advance in price.

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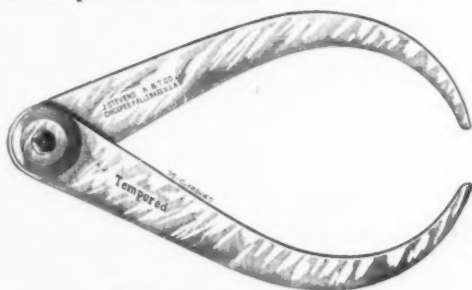
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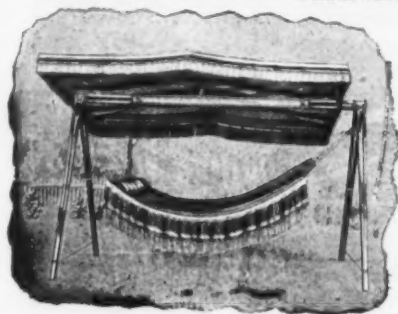
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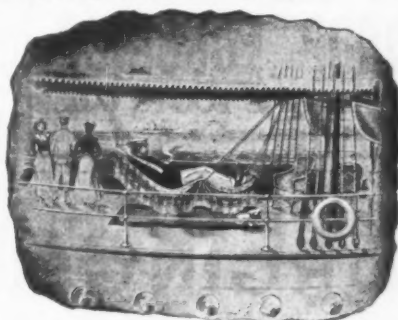


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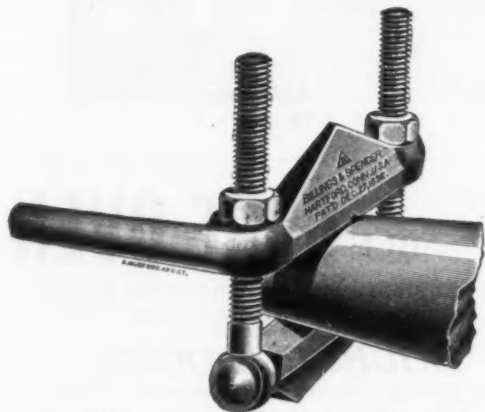
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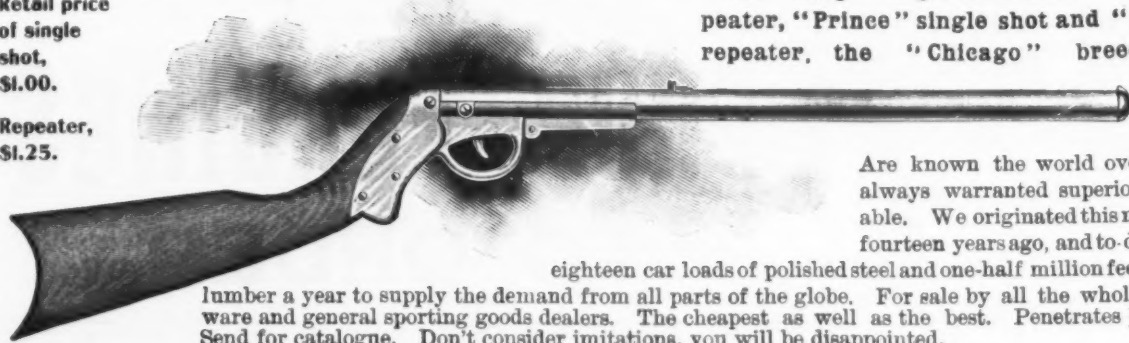
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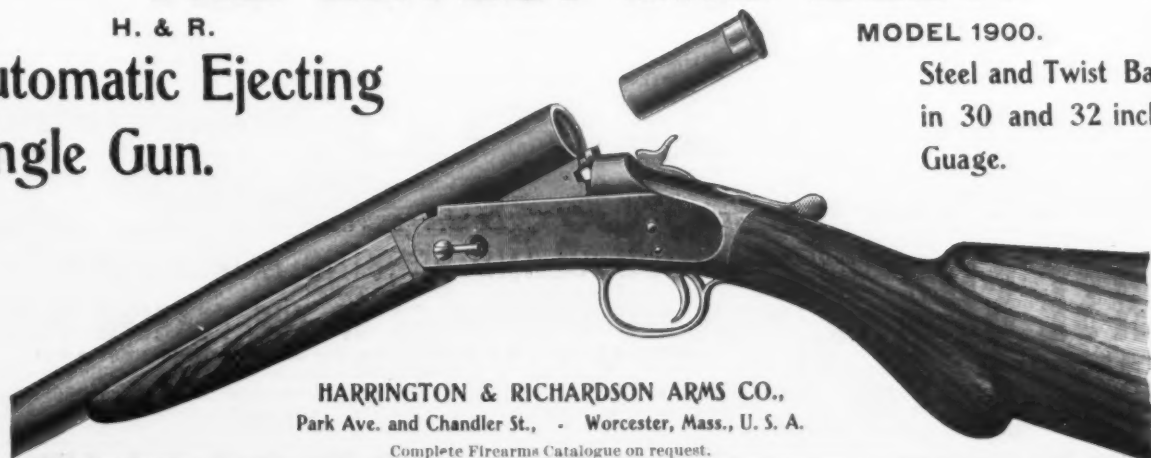
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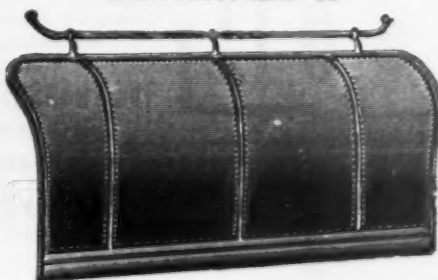
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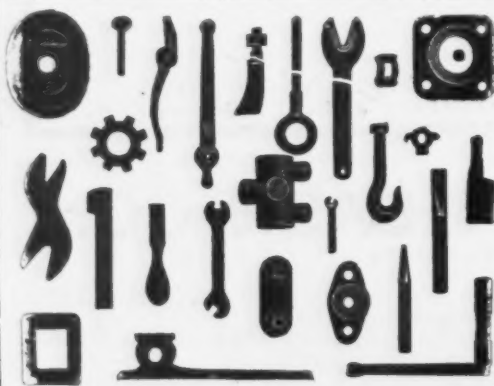
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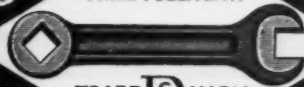
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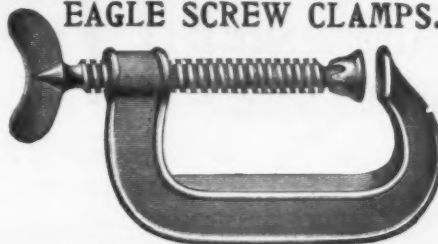
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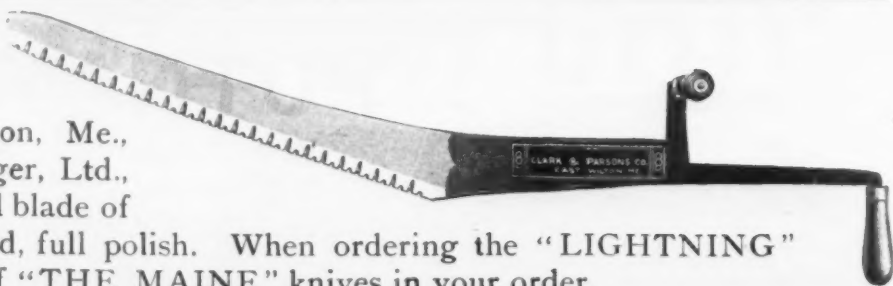
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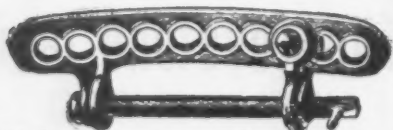
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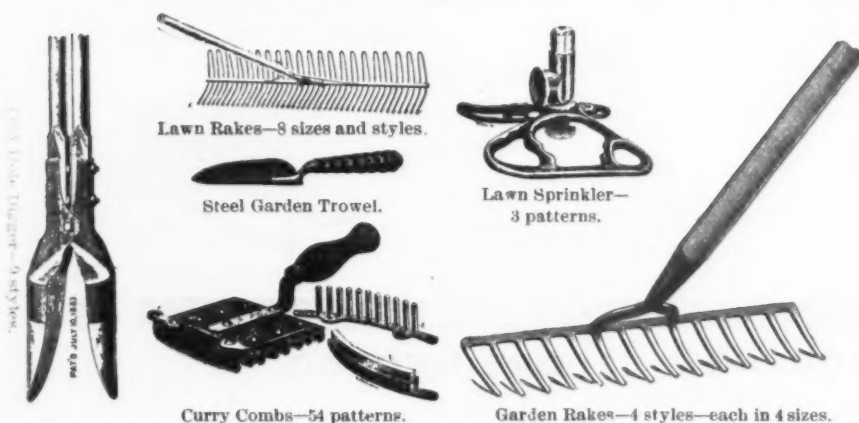
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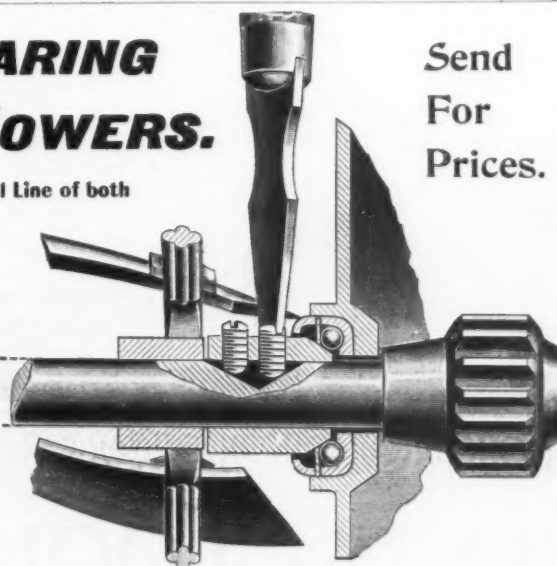


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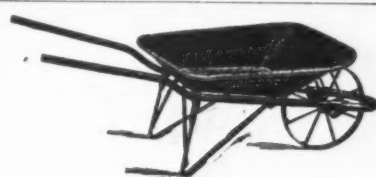


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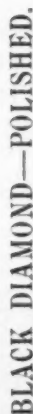
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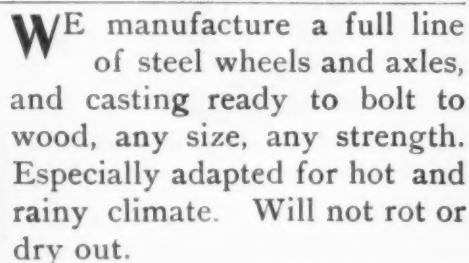


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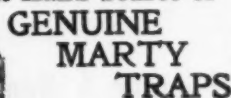
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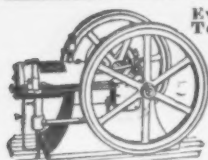
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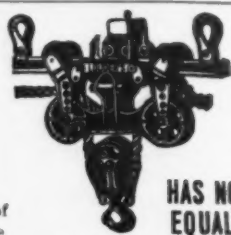
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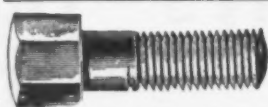
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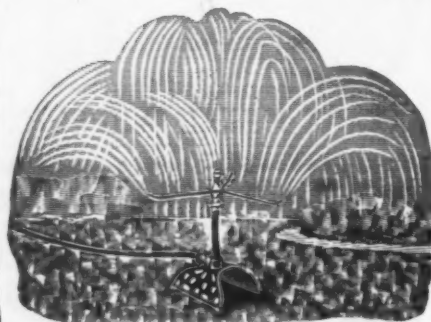
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Acme Machinery Co. 79
Acme Shear Co. 127
Acme Steel & Malleable Iron Works. 35
Adam, W. J. 8
Adams Co. 79
Adrian Machine Works. 102
Adcock, Geo. E. 107
Aiken, Henry. 44
Aix Mfg. Co. 67
Alabama Consolidated Coal & Iron Co. 28
Alexander Bros. 55
Allen, D. H. & Co. 124
Allen, E. B. 46
Allentown Rolling Mills. 39
Allis, E. P. Co. 49
American Appraisal Co. 118
American Blower Co. 82
American Bridge Co. 17
American Carbureting Co. 37
American Gas Furnace Co. 70
American Emery Wheel Wks. 65
American Hardware Mfg. Co. 119
American Iron & Steel Mfg. Co. 27
American Machinery Co. 97
American Mfg. Co. 63 & 120
American Metal Co. 3
American Nickeloid Co. 4
American Pig Iron Storage Warrant Co. 30
American Pulley Co. 61
American Railway Supply Co. 119
American Screw Co. 143
American Shearer Mfg. Co. 121
American Sheet Steel Co. 125
American Steel Hoop Co. 24
American Steel Scraper Co. 150
American Steel & Wire Co. 10
American Tin Plate Co. 25
American Tool Chest Co. 127
American Tool Works Co. 92
Ames Sword Co. 65
Ansonia Brass & Copper Co. 2
Arcade File Works. 158
Arcade Malleable Iron Co. 37
Arcade Mfg. Co. 149
Armstrong Bros. Tool Co. 75
Armstrong Mfg. Co. 71
Armstrong, K. S. & Bro. 113
Asher, A. 110
Ashtabula Valve Co. 52
Asphalt Ready Mfg. Co. 9
Athol Machine Co. 151
Athol Pump Co. 151
Atkins, E. C. & Co. 144
Atlas Bolt & Screw Co. 48
Atlas Mfg. Co. 189
Atlas Pipe Wrench Co. 155
Aultman Co. 56 & 60
Aurora Tool Works Co. 89
Automatic Machine Co. 73
Avery Stamping Co. 119 & 157
- B**
- Babcock & Wilcox Co. 53
Baeder, Adamson & Co. 122
Baird, C. R. & Co. 103
Baird, U. Machinery Co. 103
Baker Bros. 81
Baker, Jas. H. Mfg. Co. 40
Baldwin Refrigerator Co. 186
Balkwill Pattern Wks. 119
Ball Bearing Co. 82
Bardale, Joe. 139
Barker & Chard, Mich. Co. 82
Barnes, Wallace Co. 5
Barnes, W. F. Co. 104
Barnes, W. F. & John Co. 79
Barnes Mfg. Co. 152
Barnett, G. & H. Co. 159
Barnes & Reed Mfg. Co. 168
Barum, E. T. 150
Barrett, W. L. 150
Baugh Mch. Tool Co. 100
Bayley, Wm. & Sons Co. 57
Bay State Stamping Co. 68
Beaundry & Co. 81
Becker & Brainard Milling Mch. Co. 84
Belden Machine Co. 42
Bell, Edwin & Sons Co. 20
Belmer-Eames Tool Co. 89
Bemis & Call Hardware & Tool Co. 156
Benedit, M. S. Mfg. Co. 153
Benger Bros. Co. 125
Berridge Shear Co. 159
Berthe, A. 8
Bertsch & Co. 76
Besly, C. H. & Co. 7 & 190
Best, L. 66
Besemer Coke Co. 42
Bethlehem Fdry & Mch. Co. 73
Bethlehem Steel Co. 35
Bever Bros. Mfg. Co. 170
Bickford Drill & Tool Co. 88
Bicknell Hardware Co. 80
Bicycle Step Ladder Co. 135
Bigelow, J. F. 169
Bignall & Keedy Mfg. Co. 76
Billings & Spencer Co. 171
Birmingham Iron Fdry. 31
Blashop, Geo. H. & Co. 147
Bissell, E. & Co. 112
Blackman & King. 5
Blackwell, G. G. Sons & Co. 29
Blair Husking Glove Co. 165
Blair Mfg. Co. 172
Blair, Reed F. & Co. 32
Blake, M. J. & M. 119
- C**
- Cabell & Co. 33
Cahill Sales Dept. 120
Caldwell Mfg. Co. 122
California Wire Works. 57
Canfield, H. O. 180
Canton Steel Co. 32
Caprell Horse Nail Co. 1
Carburendum Co. 65
Card, S. W. Mfg. Co. 75
Carlin's Sons, Thomas Co. 80
Carter & Hakes Machine Co. 102
Cary Mfg. Co. 121
Cary Spring Works. 5
Cattaraugus Valley Co. 127
C. C. & St. L. R. R. 18
Central Hardware Co. 130
Chambers Bros. Co. 19
Champion Blower & Forge Co. 79
Champion Iron & Steel Co. 27
Champion Tool Co. 157
Chapman & Farquhar. 154
Chapman, J. B. & Co. 83
Chapman Valve Mfg. Co. 49
Charter Gas Engine Co. 48
Chattillon, John & Sons. 141
Cheney, S. & Son. 39
Cherry Valley Iron Co. 27
Chester Steel Casting Co. 83
Chicago Drop Forge & Fdy. Co. 40
Chicago Flexible Shaft Co. 95
Chicago House Wrecking Co. 111
Chicago, Milwaukee & St. Paul Ry. 114
Chicago Scale Co. 151
Chicago Screw Co. 12
Chicago Sprng Light Co. 136
Chicago Spring Butt Co. 166
Chicago Time Register Co. 129
Chicago Wheel & Mfg. Co. 151
Chilcote-Evans Chain Co. 133
Chisholm & Moore Mfg. Co. 190
Chrome Steel Works. 35
Church, Isaac. 29
Church, S. R. 29
Cincinnati Mach. Tool Co. 93
Cincinnati Milling Mch. Co. 86
Cincinnati Planer Co. 89
Cincinnati Shaper Co. 167
Chapp, E. D. Mfg. Co. 174
Clarendon Boiler Wks. 46
Clark, John W. 8
Clark & Cowles. 4
Clark & Parsons Co. 176 & 189
Clark, Quilen & Morse. 169
Clark, W. J. Co. 167
Clayton Air Compressor Wks. 51
Cleveland Block Co. 172
Cleveland City Forge & Iron Co. 1
- Cleveland Crane & Car Co.** 62
Cleveland Elevator Bucket Co. 53
Cleveland Facing Mill Co. 39
Cleveland Galvanizing Works 165
Cleveland Register Co. 131
Cleveland Stamping & Tool Co. 119
Cleveland Stone Co. 158
Cleveland Twist Drill Co. 69
Clinton Wire Cloth Co. 14
Cobb & Drew. 19
Coburn Trolley Track Mfg. Co. 146
Cooling Mfg. Co. 41
Coes Wrench Co. 155
Columbus Mail & Gray Iron Casting Co. 41
Concord Axle Co. 176
Conn. Valley Mfg. Co. 125
Consolidated Iron & Steel Co. 28
Consolidated Raily Electric Lighting & Equipment Co. 41
Continental Tool Co. 173
Cook, A. D. 54
Cook, A. S. & Co. 81
Cook, H. C. & Co. 130
Cook, T. W. G. 107
Cornell, J. B. & J. M. 9
Cotton, Barclay W. & Co. 85
Covert Mfg. Co. 179
Covert's Saddlery Works. 121
Cox, Justice, Jr. & Co., Ltd. 31
Cramp, Wm. & Sons S. & E. B. Co. 3
Crane, W. M. Co. 36
Crescent Phosphorized Metal Co. 3
Crescent Steel Co. 32
Cresson, Geo. V. Co. 56
Cronk Hanger Co. 176
Crosby Steam Gage & Valve Co. 47
Cross & Speirs Machine Co. 85
Cunliffe, R. M. 113
Curtis & Curtis. 76
Cushman Chuck Co. 72
- D**
- Dallett, Thos. H. & Co. 90
Dane, Stoddard & Co. 172
Danielson Mch. & Tool Co. 108
D'Amour & Littlefield Mch. Co. 63
Dangler Stove & Mfg. Co. 163
Dary, Edw. & Sons. 14
Davis, E. M. Mfg. Co. 51
Davis, W. P. Machine Co. 30
Davis & Buxton Stamping Co. 170
Davis, John & Sons. 2
Dawson, A. L. & Co. 110
Dawson & Goodwin. 107
Deane Mch. Wks. 77
DeKalb Fence Co. 13
Denning Co. 152
Denham Mfg. Co. 139
Dennison & Davis. 30
Detrick & Harvey Machine Co. 78
Diamond Drill & Mch. Co. 36
Diamond Machine Co. 65
Diamond Tack & Nail Wks. 22
Dickinson, I. L. 64
Dieckert & Eisenhardt. 71
Dillon-Griswold Wire Co. 11
Dimmick, J. K. & Co. 27
Dismont, Henry & Son. 123
Divine Bros. Co. 64
Dixon, Jos. Crucible Co. 85
Doan, J. B. & Co. 103
Dodge Machine Screw Co. 84
Dodge Mfg. Co. 59
Dooler Mfg. Co. 74
Donaldson & Newton. 113
Donnelly, John & Co. 124
Drake Acetylene Apparatus Co. 125
Draper Machine Tool Co. 104
Drees, Mueller & Co. 86
Drove, G. Co. 137
Du Bois Iron Works. 43
Dubuque Machine Concern. 80
Dudgeon, Richard. 79
Duff Patents Co. 44
Dunbar Bros. 6
Dunham Nut Co. 19
Dunn, Jas. F. 62
Dupont Mfg. Co. 61
Durant, W. N. 49
Dwiggins Wire Fence Co. 8
- E**
- Eagle Anvil Works. 156
Eastern Bridge & Structural Co. 22
Eastern Forge Co. 41
Eastern Machinery Co. 53
Eccles, Richard. 175
Eckstein, C. G. 62
Eckstein Refrigerator Works. 145
Edwards Electric Mfg. Co. 46
Edson Mfg. Co. 46
Eimer & Amend. 42
Electric Controller & Supply Co. 61
Electric Wheel Co. 178
Ellis & Halfenberger. 11
Ellis, F. S. & Son. 74
Ely Hammer & Fork Co. 173
Empire Pipe Bending & Supply Co. 5
Energy Elevator Co. 159
Ensign, Blackford & Co. 124
Enterprise Foundry Co. 161
Enterprise Mfg. Co. 161
Erie & Schenck. 8
Erie Specialty Co. 131
Erikson, Edw. E. 44
Estev Wire Works Co. 7
Etting, Edw. J. 37
- F**
- Fairbanks Co. 75
Fairmount Machine Co. 56
Farrel Foundry & Mch. Co. 33
Fay, J. A. & Egan Co. 70
Felten & Guillaume Carls-werk. 9
Ferracute Mach. Co. 78
Ferro Carbon Casting Co. 39
Filler & Stowell Co. 49
Finished Steel Co. 26
Fish, H. C. Machine Works. 80
Fitch, W. & E. T. Co. The. 189
Fitchburg Machine Works. 83
Flagg, Stanley G. & Co. 190
Flint & Walling Mfg. Co. 152
Ford Bit Co. 127
Forest City Foundry & Mfg. Co. 174
Forest City Steel & Iron Co. 113
Forster-Miller Engineering Co. 44
Fox Cutlery Co. 129
Fox Machine Co. 169
Frankford Steel Co. 40
Frank-Kneeland Mach. Co. 36
Franklin, H. H. Mfg. Co. 113
Franklin Mch. Works. 68
Fray, Jno. S. & Co. 129
Frick, H. C. Coke Co. 120
Frost Wire Fence Co. 7
Fulton Iron & Engine Works. 50
- G**
- Gardner Bros. 89
Garland Chain Co. 125
Garrison, A., Foundry Co. 36
Garry Iron & Steel Roofing Co. 9
Garvin Machine Co. 81
Gay, Geo. E. 131
Gem Mfg. Co. 121
General Electric Co. 50
General Supply Co. 56
Geometric Drill Co. 98
Gerlach, Peter & Co. 75
Gilbert & Bennett Mfg. Co. 14
Gilmour, J. 82
Gleason Tool Co. 190
Globe-Wernicke Co. 149
Goepel & Kaezner. 7
Gong Bell Mfg. Co. 170
Goodell Co. 128
Goodell, J. A. & Co. 140
Goodwin & Kintz Co. 119
Gorton, Geo. Machine Co. 66
Gould & Eberhardt. 73
Graham, John H. & Co. 154
Grand Crossing Tack Co. 19
Grand Rapids Hardware Co. 169
Gray, Robt. J. 108
Green, A. H. 135
Greiner, F. Co. 113
Griffin Mfg. Co. 127
Griswold Wire Co. 3
- H**
- Hagen & Reid. 131
Haines Gauge Co. 41
Hall & Naumann. 4
Hall, Thomas. 154
Hall, Samuel & Sons. 16
Hamilton Rifle Co. 173
Hammer & Co. 155
Handy Ladder Works. 173
Hannan & Finton. 109
Hanson & Van Winkle Co. 51
Harrington, E. Son & Co. 97
Harrington & King Perforated Steel Co. 5
Harrington & Richardson Arms Co. 178
Harris Machinery Co. 106
Harris, Samuel & Co. 156
Harrisburg Fdry & Mach Wks. 10
Harrison Safety Boiler Wks. 58
Hart, B. A. Machine. 84
Hartford Steam Boiler Insp. & Ins. Co. 47
Hartigan, W. R. 132
Hartman Mfg. Co. 12
Hartzell, Emmert. 129
Harvey, Arthur C. Co. 36
Haskell, Wm. H. Mfg. Co. 30
Havana Metal Wheel Co. 179
Haven Malleable Castings Co. 119
Haws, W. H. Fire Brick Co. 39
Hay, Budden Mfg. Co. 157
Hazard Mfg. Co. 7
Heald, L. S. & Son. 68
Heasley Machine, Variety Iron & Tool Works. 4
Heat Transmission Co. 54
Heinrichs, R. Sons. 127
Heller Bros. Co. 137
Heller Box Co. 135
Hewitt Mfg. Co. 161
Henderson's A. L. Sons. 39
Henderson Bros. 121
Hendricks Machine Co. 121
Hendricks Bros. 2
Hendryx, A. B. Co. 3
Henry, J. T. Mfg. Co. 126
Hess Machine Co. 67
Hess, Snyder & Co. 43
Hewitt & Patterson. 4
Hibbard, W. H. 85
Hickman, Williams & Co. 29
Hilbert, F. & Son. 3
Hilbert Freiberg Mch. Tool Co. 80
- Hill, Henry F.** 106
Hill, N. N. Brass Co. 170
Hill, Clarke & Co. 95 & 106
Hill Dryer Co. 189
Hill Tool Co. 131
Hilles & Jones Co. 30 & 110
Hillman, J. H. & Son. 109
Hiltner, H. A. Sons. 110
Hobson, Houghton & Co. 30
Hoefer Mfg. Co. 83
Hofeller, Theo. & Co. 121
Hoffman, C. & A. 132
Hoffman, Geo. W. 151
Hoggson & Pettis Mfg. Co. 72
Hollands Mfg. Co. 159
Hollinger Fence Co. 5
Hollow Grip Horse Shoe Co. 180
Horsburgh & Scott. 64
Horton, E. & Son Co. 71
Hough Cash Recorder Co. 185
Houghton & Huxton Mfg. Co. 119
Houston, C. B. & Co. 31
Howard Iron Works. 158
Howard & Morse. 7
Howes, S. M. Co. 150
Howson & Howson. 7
Hubbell, Harvey. 16
Huber, S. V. & Co. 41
Hull & Hoyt Co. 135
Humphreys Mfg. Co. 152
Hunkeford, U. T. Brass & Copper Co. 3
Hunt, C. W. Co. 56
Huribut Rogers Mach. Co. 82
- I**
- Ideal Machine Works. 75
Ideal Mfg. Co. 170
Illinois Maintenance Co. 108
Illinois Screw Co. 180
Illinois Steel Co. 113
Illinois Zinc Co. 3
Imperial Bit & Snap Co. 179
Imperial Gas Lamp Co. 136
Indianapolis Drop Forging Co. 41
Ingersoll Milling Machine Co. 90
Ingersoll-Sergeant Drill Co. 54
International Silver Co. 129
International Sprinkler Co. 99
Iowa Farming Tool Co. 179
Ironides Co. 4
Isaac Joseph Iron Co. 113
Ives, H. B. & Co. 121
Ivins, Ellwood. 28
- J**
- Jackson Flue Scraper Co. 53
Jackson Knife & Shear Co. 132
Janney, Steinmetz & Co. 7
Jarecki Mfg. Co. 77
Jefferson Iron Co. 103
Jeffrey Mfg. Co. 56
Jencks, E. Mfg. Co. 5
Jenkins Bros. 1
Jenkins Iron & Tool Co. 128
Jenkinson, K. C. & Co. 6
Jennings, C. E. & Co. 126
Jennings, Russell Mfg. Co. 127
Jessop, Wm. & Sons. 30
Johnson, I. H. Jr. & Co. 73
Johnson, Clapham & Morris. 112
Johnson, Iver, Arms & Cycle Works. 19
Johnson, Wm. C. & Sons Mch. Co. 110
Jones, H. & Co. 31
Jones, Jesse Paper Box Co. 135
Jones & Bonneras. 137
Jones & Lamson Machine Co. 96 & 120
Jones & Laughlin, Ltd. 42
- K**
- Kampfe Bros. 133
Keagy & Lear Machine Co. 71
Keagy Pulley Co. 60
Keely, Jerome & Co. 31
Keen & Hagerty Mfg. Co. 61
Kelley, B. F. & Son. 107
Kennedy, Julian. 42
Kennedy, Walter. 44
Kennedy Valve Mfg. Co. 130
Keystone Drop Forge Works. 66
Keystone Mfg. Co. 154
Kidd Bros. & Burger Steel Wire Co. 7
Kluder, R. E. 91
Kilborn & Bishop Co. 89
Kilbourne & Jacobs Mfg. Co. 174
Kilbourne Mfg. Co. 11
Kilmer Wire Mfg. Co. 129
Kimball, C. J. Co. 129
Kimball Bros. & Sprague. 20
King, J. M. & Co. 159
Kohler, F. E. & Co. 177
Kokomo Fence Mch. Co. 8
Konigslow, E. & Bro. 119
Krusse Kross Klevia Co. 176
Kupferle, Jno. C. 119
- L**
- La Belle Steel Co. 32
Ladd, W. C. 138
Lake City Engineering Co. 48
Lamond, David. 44
Lands Tools Co. 68
Lane Brothers Co. 169
Lang Cutlery Works. 125
Lanz, M. & Sons. 20
Larimer Mfg. Co. 166
- N**

A
Albany, Alex. & Co. 1
Law, Ernest & Co. 81
Lawrence Bros. 161
Lawson Mfg. Co. 166
Lea, J. T. & Co. 81
Lea, E. B. & Co. 113
LeCount, Wm. G. 158
Lefel, James & Co. 48
Lefler, Chas. & Co. 84
Leng, Jno. S. & Son & Co. 191
Leonard, John & Co. 113
Leonhardt & Co. 175
Leschen, A. & Sons Rope Co. 7
Levis, Henry & Co. 35
Lewis Tool Co. 159
Lidgerwood Mfg. Co. 190
Lillenberg, J. 32
Lima Steel Castings Co. 38
Lindsay, W. W. & Co. 27
Link-Belt Engineering Co. 57
Litchfield, J. M. 163
Livermore, Homer F. 374
Lloyd Mfg. Co. 164
Lockhart Iron & Steel Co. 30
Loche Steel Belt Co. 53
Lodge & Shipley Mch. Tool Co. 914
Logan Iron & Steel Co. 113
Logan & Strobbridge Iron Co. 128
Lorain Foundry Co. 35
Lorain Steel Co. 32
Louden Mch. Co. 32
Louisville & Nashville R. R. 114
Loyd, John Co. 127
Ludlow-Saylor Wire Co. 9
Lufkin Rule Co. 134
Lukens Iron & Steel Co. 29
Lund, S. T. 107
Lunkenheimer Co. 51
Lyon, N. 166

M
McCabe, J. J. 89
McCabe Hanger Mfg. Co. 184
McCaffrey File Co. 158
McClure, G. W. & Son & Co. 44
McCooy, Jos. F. Co. 61
McCullough Iron Co. 26
McDowell, Stocker & Co. 109
McFarland, Wm. 6
McGowan, J. H. & Co. 54
McInnes, C. E. 29
McKay, Jas. & Co. 28
McKenna Bros. Brass Co. 131
McKinney Mfg. Co. 165
McKinnon Dash Co. 178
McLain, J. H. Co. 88
McNab & Harlin Mfg. Co. 48
Machinists Supply Co. 112
Macomber & Whyte Rope Co. 6
Magnolia Metal Co. 1
Main Belting Co. 53
Maine Mfg. Co. 130
Malin & Co. 57
Manning, Maxwell & Moore. 108
Manville Machine Co., E. J. 105
Markham Air Ride Co. 173
Markle Lead Works. 119
Marlin Fire Arms Co. 170
Marshall & Huchart Machy. Co. 103
Mason & Parker Co. 136
Mason Regulator Co. 43
Massey Vise Co. 150
Matthiessen & Hegeler Zinc Co. 2
Maurer, H. & Son. 39
May, J. B. & Co. 118
Mayer, M. H. Electric Co. 135
Mayhew, H. H. Co. 135
Maywood Fdry & Mch. Co. 48
Merchant & Co. 3
Merkel, H. 136
Merrell Mfg. Co. 71
Merrill Bros. 117
Merrick, C. S. & Co. 79
Mesta Machine Co. 35
Meyers, F. J. Mfg. Co. 145
Michigan Wire Cloth Co. 15
Midulston & Co. 138
Mietz, Aug. 48
Miller, G. A. & Co. 135
Miller, E. & Co. 118
Miller, C. & Son Co. 190
Miller, H. J. 18
Miller & Van Winkle. 190
Millers Falls Co. 122
Millett Core Oven Co. 172
Milton Mfg. Co. 19
Milwaukee Pack Co. 16
Miner & Peck Mfg. Co. 80
Mitchell, W. B. 177
Mohr, J. J. 31
Monroe, S. G. & Co. 122
Monroe, W. M. & Co. 174
Moore, F. M. 138
Moore, Franklin Co. 11
Morgan Construction Co. 11
Morgan Spring Co. 5
Morley Bros. 132
Morris, Chas. 153
Morris, F. Hollingsworth. 40
Morrison, Robert. 47
Morrow, F. C. 173
Morse & Twiss Drill & Mch. Co. 6
Morse, Williams & Co. 57
Morton, Thos. 169
Morton Mfg. Co. 82
Moseley Iron Bridge & Root Co. 22
Mosberg, F. 119
Mosberg & Granville Manufacturing Co. 103
Muxford, A. 128

N
Nash, Geo. & Co. 31
National Cutlery Co. 126
National Elastic Nut Co. 16
National Horse Nail Co. 174
National Machinery Co. 70
National Machine Tool Co. 89
National Pipe Bending Co. 52
National Saw Co. 124
National Sewing Machine Co. 151
National Specialty Mfg. Co. 161
National Steel Co. 29
National Tube Co. 23
National Wire Corp. 15
Naugatuck Mfg. Co. 53
Nass, Geo. M., Jr. 159
New Albany Mfg. Co. 40
New Century Mfg. Co. 170
New Doty Mfg. Co. 87
New England Motor Co. 52
New England Specialty Co. 123
New England Steel Casting Co. 33
New England Structural Co. 22
New Freedom Wire Cloth Co. 15
Newhall, Henry B. 18
New Haven Mfg. Co. 77
New Haven Wire Mfg. Co. 5
N. J. Iron & Metal Co. 113
N. J. Wire Cloth Co. 14
Newkirk, J. B. & Co. 31
Newport News Shipbuilding & Dry Dock Co. 49
New Process Twist Drill Co. 68
N. Y. Air Compressor Co. 54
N. Y. Blower Co. 81
N. Y. Machinery Depot. 106
N. Y. Stamping Co. 130
Ney Mfg. Co. 176
Niagara Machine & Tool Works. 91
Niagara Screw Co. 16
Nicholson, W. H. & Co. 62
Nicholson File Co. 121
Nicol & Co. 126
Nicol, B. & Co. 113
Niles Tool Works Co. 94
Nilson, A. H. Mch. Co. 88
Nolte Brass Co. 46
North American Metalline Co. 3
North Bros. Mfg. Co. 122
Northampton Emery Wheel Co. 64
Northern Engineering Works. 62
Northfield Knife Co. 126
Norton Emery Wheel Co. 64
Norton Mfg. Co. 127
Norwalk Iron Works Co. 54
Norwalk Lock Co. 166
Norwalk Pattern & Mfg. Co. 37
Novelty Mfg. Co. 162
Nut & Washer Mfg. Co. 16
Nuttall, R. D. Co. 92

O
Obermayer, S. Co. 36
Ogden Mfg. Co. 165
Ogden & Wallace. 35
Ohio Pulley Co. 61
Oneda Community. 131
Ormsby, E. A. & Wire Co. 8
Ornamental Iron Works. 136
Osborn Mfg. Co. 139
Ossawa Mills Co. 139
Oster Mfg. Co. 74
Ostrander Fire Brick Co. 39
Ostrander, W. R. & Co. 160
Otis Steel Co. 33

P
Palmer, I. E. 171
Palmer Hardware Mfg. Co. 169
Paradox Machinery Co. 109
Pardee, C. works. 28
Park City Mfg. Co. 118
Parker, Chas. Co. 163
Park, S. & Co. 129
Passaic Rolling Mill. 78
Patch, F. R. Mfg. Co. 78
Patterson, F. L. 110
Patterson Tool & Supply Co. 86
Pawling & Harnischfeger. 62
Paxson, J. W. Co. 47
Peck, S. W. & Wire Co. 160
Peck & Ayer Co. 47
Peerless & Ayer Co. 164
Peerless Rubber Mfg. Co. 58
Pelouze Scale & Mfg Co 118
Pennsylvania Engineering Works. 42
Pennsylvania Machine Co. 107
Perkins, B. F. & Son. 82
Perkins Machine Co. 82
Perry, F. H. & Co. 131
Peters, Cartridge Co. 120
Phenix Mfg. Co. 167
Phenix Tube Co. 33
Phila. Machine Works. 22
Phila. Machine Tool Co. 82
Phila. Pneumatic Tool Co. 86
Phila. Roll & Machine Co. 86
Phillips, F. R. & Sons Co. 85
Phillips, E. & Sons. 21
Phenix Horseshoe Co. 174
Phosphor Bronze Smelting Co. 29
Pierson & Co. 26
Pike Mfg. Co. 131
Pilling & Crane. 1

Pittkin, A. B. Machinery Co. 108
Pittsburgh Mfg. Co. 76
Pittsburgh Reduction Co. 120
Pittsburgh Screw & Bolt Co. 38
Pittsburgh Shear, Knife & Machine Co. 76
Pittsburg Steel Shaffing Co. 82
Plunger & Henger Mfg. Co. 190
Plume & Atwood Mfg. Co. 2
Plymouth Mills. 26
Pneumatic Crane Co. 41
Poinier & Leater. 39
Pollock, W. B. Co. 48
Pool Machine Tool Co. 94
Pond, Robt. & Son Co. 53
Port Chester Bolt & Nut Co. 21
Porter, H. K. 19
Potter & Johnston Co. 98
Potts, Horace T. & Co. 16
Poulter & Co. 106
Pratt Chuck Co. 74
Pratt & Whitney Co. 30
Prentice Bros. Co. 104
Prentiss, Geo. W. & Co. 8
Prentiss Tool & Supply Co. 104
Prentiss Vise Co. 139
Presbrey Fire Brick Co. 39
Primrose, Henry E. 46
Pritzlaff, Jno. Hdw. Co. 134
Pugh, Job T. 127
Pullman, J. Wealey. 31
Pullman Sash Balance Co. 169
Putnam Nail Co. 175

Q
Quint, A. D. 78

R
Rand Drill Co. 53
Randolph-Clowes Co. 2
Rawson Electric Co. 179
Read, A. P. & Co. 136
Reade, Wm. A. & Co. 110
Reading Crane & Hoist Works. 61
Reading Hardware Co. 125
Reading Screw Co. 6
Red Jacket Mfg. Co. 152
Reece, E. F. Co. 71
Reed & Curtis Mch. Screw Co. 85
Reeves, Paul S. 199
Reinke, Wilson Co. 162
Relliance Mch. & Tool Co. 74
Remington Arms Co. 170
Republic Iron & Steel Co. 189
R. I. Perkins Horse Shoe Co. 174
Rhode Island Tool Co. 19
Richard Mfg. Co. 67
Richmond Cedar Works. 161
Ridgway, Cart & Son Co. 59
Ridley & Bright. 15
Ritter-Conroy Mfg. Co. 22
Rockford Bolt Works. 16
Rockwell Engineering Co. 43
Rogers, M. H. 113
Rogers, Jno. M. Boat, Gauge & Drill Works. 67
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Rowland, William & Harvey. 19
Royersford Fdry. & Mach. Co. 85
Rudolph & Krummel. 77
Ruger, J. W. Mfg. Co. 49
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Russell & Erwin Mfg. Co. 137
Rutter, A. T. 2
Ryan, J. J. & Co. 2

S
Sabin Machine Co. 5
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Union Steel Casting Co., Pittsburgh, Pa.
United States Steel Co., Boston, Mass.

Ceilings, Metal
Youngstown Iron & Steel Roofing Co., Youngstown, O.

Cements, Iron
Smooth On Mfg. Co., Jersey City N. J.

Chalu
Bradlee & Co., Philadelphia.

- Bridgeport Chain Co., Bridgeport, Ct.
Chilcott-Evans Chain Co., Allegheny, Pa.
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
Jenkins Iron & Tool Co., Howard, Pa.
Link-Belt Engineering Co., Phila., Pa.
Locke Steel Belt Co., Bridgeport, Conn.
McKay Jas. & Co., Pittsburgh, Pa.
Nicholson & Co., Pittsburgh, Pa.
Onelda Community, Ltd., Niagara Falls
Standard Chain Co., Pittsburgh, Pa.
- Chain Plants**
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.
- Chemicals**
Lum-r & Amend, New York.
- Cherry Stokers**
Enterprise Mfg. Co., Philadelphia, Pa.
Goodell Co., Antrim, N. H.
- Chisels**
Buck Bros., Millbury, Mass.
Buck, Chas., Millbury, Mass.
Jennings, C. E. Co., 101 Reade St., N. Y.
White, L. & J. Co., Buffalo, N. Y.
- Christmas Tree Holders**
Donald Ly., John, Branford, Conn.
North Bros. Mfg. Co., Philadelphia, Pa.
- Chucks**
Cushman Chuck Co., Hartford, Conn.
Doehler Mfg. Co., Middletown, Conn.
Goodell Pratt Co., Greenfield, Mass.
Hogson & Pettis Mfg. Co., New Haven.
Holland Mfg. Co., Erie, Pa.
Horton, E. & Son Co., Windsor Locks, Ct.
Ideal Machine Works, Hartford, Conn.
Pratt Chuck Co., Frankfort, N. Y.
Skinner Chuck Co., New Britain, Conn.
Standard Tool Co., Cleveland, O.
Union Mfg. Co., 103 Chambers, N. Y.
Whitton, B. E. Mach. Co., New London.
- Cider Mills**
Hart, R. W. & Co., Norfolk, Va.
- Circular Sawing Machines**
Kidder, B. E., Worcester, Mass.
- Clamps**
Besley, C. H. & Co., Chicago, Ill.
Hill, Thos., Brooklyn, N. Y.
Hammer & Co., Branford, Conn.
- Clevis**
Kraus Kross Klevis Co., Higginsville, Mo.
- Clipping Machines**
Auer, Shearer Mfg. Co., Nashua, N. H.
Chicago Flexible Shaft Co., Chicago, Ill.
McCoy, Jos. F., 35 Warren St., N. Y.
Wiebusch & Hilger, Ltd., 9-15 Murray St., N. Y.
- Clocks, Gold Plated**
Burdick, M. S. Mfg. Co., E. Syracuse, N. Y.
- Clothes Dryers**
Alli Dryer Co., Worcester, Mass.
- Clothes Line Hook**
Wilson, E. H. & Co., Allston, Mass.
- Clothes Pins**
U. S. Clothes Pin Co., Montpelier, Vt.
- Coal**
Alabama Consolidated Coal & Iron Co., Birmingham, Ala.
Sloss Sheffield Steel & Iron Co., Birmingham, Ala.
Washington Coal & Coke Co., Dawson, Pa.
Wister, Francis, Philadelphia, Pa.
- Coal Picks**
Jenkins Iron & Tool Co., Howard, Pa.
- Coffee and Spice Mills**
Arcade Mfg. Co., Freeport, Ill.
Parker, Chas. Co., Meriden, Conn.
- Coke**
Alabama Consolidated Coal & Iron Co., Birmingham, Ala.
Bessemer Coke Co., Pittsburgh, Pa.
Cherry Valley Iron Co., Pittsburgh, Pa.
Dimmick, J. & Co., Phila., Pa.
Frick, H. C. & Co., Phila., Pa.
Houston, C. B. & Co., Philadelphia, Pa.
Sloss Sheffield Steel & Iron Co., Birmingham, Ala.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Virginia Iron, Coal & Coke Co., Bristol, Va. - Tenn.
Washington Coal & Coke Co., Dawson, Pa.
Wister, Francis, Philadelphia, Pa.
- Compressed Air Machinery**
Phila. Pneumatic Tool Co., Phila., Pa.
- Conductor Pipe**
Berger Bros. Co., Philadelphia, Pa.
- Conveying Machinery**
Aultman Co., Canton, Ohio.
Brown Hoisting Machinery Co., Cleveland, Ohio.
California Wire Works, San Francisco.
Du Bois Iron Works, Du Bois, Pa.
Hunt, C. W. Co., W. New Brighton, N. Y.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Engineering Co., Phila., Pa.
- Cooking Utensils**
Cleveland Stamping & Tool Co., Cleveland, O.
- Coping Saw**
Jones & Dommersnas, Chicago, Ill.
- Copper**
Hendricks Bros., 49 Cliff, N. Y.
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
United Metals Selling Co., 11 Broadway, N. Y.
- Copper Hammers**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Copper Rivets and Burrs**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Copper Tracks and Nails**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Cordage**
Macomber & White Rope Co., Chicago
Samson Cordage Works, Boston, Mass.
Silver Lake Co., Boston, Mass.
- Core Ovens**
Millett Core Oven Co., Brighwood, Mass.
- Cork Screws and Cork Pullers**
Erle Specialty Co., Erie, Pa.
- Corn Hooks**
Whitington & Cooley Mfg. Co., Jackson, Mich.
- Corn Huskers**
Wheeler Mfg. Co., Aurora, Ill.
- Cornice Brakes**
Bertsch & Co., Cambridge City, Ind.
- Corrugated Iron and Steel**
Garry Iron & Steel Roofing Co., Cleveland, O.
McDonough Iron Co., Wilmington, Del.
Seafie, Wm. B. & Sons, Pittsburgh.
- Cotter Pin Machines, Automatic**
Shuster, F. B. Co., New Haven, Conn.
- Cotton Ties**
American Steel Hoop Co., Battery Park Building, N. Y.
- Counting Machines**
Durant, W. N. Milwaukee, Wis.
Hart, E. A., Battle Creek, Mich.
- Couplings, Compression**
Sennett, Geo. B. Co., Youngstown, O.
- Cow Ties**
Onelda Community, Ltd., Niagara Falls, Pa.
- Cranes**
Brown Hoisting Machinery Co., Cleveland, Ohio.
Chisholm & Moore Mfg. Co., Cleveland.
Cleveland Crane & Car Co., Cleveland, O.
Niles Tool Works Co., 136-138 Liberty St., N. Y.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger, Milwaukee, Wis.
Pneumatic Crane Co., Pittsburgh, Pa.
Reading Crane & Hoist Wks., Reading, Pa.
Ridgway, Craig & Son Co., Coatesville, Pa.
Spindel, J. G., Reading, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.
- Crayon**
Steward, D. M. Mfg. Co., Chattanooga, Tenn.
- Crucibles**
Dixon, Jos. Crucible Co., Jersey City, N. J.
- Cupolas**
Northern Engineering Works, Detroit.
Paxson, J. W. Co., Philadelphia, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.
- Cupolas, Hot Blast**
Byram & Co., Detroit, Mich.
- Curry Combs**
New York Stamping Co., Brooklyn, N. Y.
- Cutlery**
Cattaraugus Cutlery Co., Little Valley, N. Y.
Chaffin, John & Sons, 85 to 89 Cliff St., N. Y.
Dame, Stoddard & Co., Boston.
Goodell Co., Antrim, N. H.
Hartzell, Emmert, Fairfield, Pa.
Kimball, C. J. Co., Bennington, N. H.
Northfield Knife Co., Northfield, Conn.
Parkhurst, L. D., Danielson, Conn.
Southington Cutlery Co., Southington, Conn.
Wiebusch & Hilger, Ltd., 9 to 15 Murray St., N. Y.
- Cutting Off Machines**
Hurlbut Rogers Mach. Co., So. Sudbury, Mass.
- Dampers**
Logan & Strobbridge Iron Co., New Brighton, Pa.
Stover Mfg. Co., Freeport, Ill.
Williams, A. C., Ravenna, O.
- Dashes and Fenders**
McKinnon Dash Co., Buffalo, N. Y.
- Deborers**
Brown, H. H. Mfg. Co., Decatur, Ill.
- Diamond Tools**
Dickinson, Thos. L., 45 Vesey St., N. Y.
- Dies**
Adriance Mach. Works, Brooklyn, N. Y.
Bliss, E. W. Co., Brooklyn, N. Y.
Ferracuta Mach. Co., Bridgeport, N. J.
Hay-Budden Mfg. Co., Brooklyn, N. Y.
Mossberg, Frank Co., Attleboro, Mass.
Richard Mfg. Co., Bloomburg, Pa.
Wilson & Smith, Worcester, Mass.
- Dog Collars**
Union Hardware Co., Torrington, Ct.
- Door Bells, See Bells and Gongs.**
- Door Checks and Springs**
Bardsley, Jos., 147 151 Baxter St., N. Y.
Larimer Mfg. Co., Latrobe, Pa.
Ogden Mfg. Co., Newark, N. J.
Pullman Sash Balance Co., Rochester, N. Y.
Russell & Erwin Mfg. Co., New York.
- Door Holders**
Caldwell Mfg. Co., Rochester, N. Y.
- Draught Springs**
Burditt & Williams, Boston, Mass.
- Draw Benches**
Richard Mfg. Co., Bloomsburg, Pa.
Thompson, Hugh L., Waterbury, Ct.
- Drawing Stands**
Allen, D. H. & Co., Miamisburg, O.
- Drill Grinders**
Heald, L. S. & Son, Barre, Mass.
Sellers, Wm. & Co., Inc., Phila., Pa.
Washburn Shops of Worcester Polytechnic Inst., Worcester, Mass.
Wilmarth & Norman, Grand Rapids, Mich.
- Drilling Machines**
Aurora Tool Works, Aurora, Ind.
Baker Bros., Toledo, O.
Barnes, F. B. Co., Rockford, Ill.
Barnes, W. F. & John Co., Rockford, Ill.
Baush Mch. Tool Co., Springfield, Mass.
Bickford Drill & Tool Co., Cin., Ohio.
Bullard Machine Tool Co., Bridgeport, Ct.
Burnham, Geo. Co., Worcester, Mass.
Champion Blower & Forge Co., Lancaster, Pa.
Cincinnati Mch. Tool Co., Cincinnati, O.
Dalliet, Thos. H. & Co., Philadelphia.
D'Amour & Littlefield Mch. Co., 131 Worth St., N. Y.
Davis, W. F., Machine Co., Rochester, N. Y.
Detrick & Harvey Mch. Co., Baltimore, Md.
Dresae, Mueller & Co., Cincinnati, O.
Fondack & Holloway Mach. Tool Co., Cincinnati, O.
Harrington, E. Son & Co., Phila., Pa.
Hill, Clarke & Co., Boston, Mass.
Hofer Mfg. Co., Freeport, Ill.
Niles Tool Works Co., 136-138 Liberty St., N. Y.
Prentice Bros., Worcester, Mass.
Quint, A. D., Hartford, Conn.
Shuster, F. B. Co., New Haven, Conn.
Shley & Ware, So. Bend, Ind.
Stourcurey Tool Co., Hartford, Conn.
Silver Mfg. Co., Salem, O.
Slate Wright Machine Co., Hartford, Ct.
Stow Flexible Shaft Co., Phila., Pa.
Wheeler & Russell Mfg. Co., Greenfield, Mass.
Woodward & Rogers, Hartford, Conn.
York, S. M. Co., Cleveland, O.
- Drilling Machines, Automatic**
Gould & Eberhardt, Newark, N. J.
- Drive Chains**
Locke Steel Belt Co., Bridgeport, Conn.
- Drop Forgings**
Linden Machine Co., New Haven, Conn.
Billings & Spencer Co., Hartford, Conn.
Chicago Drop Forging & Fdry. Co., Kensington, Ill.
Clapp, E. D. Mfg. Co., Auburn, N. Y.
Consolidated Railway Electric Lighting & Equipment Co., 100 Broadway, N. Y.
Ecclae, Richard, Auburn, N. Y.
Indianapolis Drop Forging Co., Indianapolis, Ind.
Keystone Drop Forge Co., Philadelphia.
Kilborn & Blahop Co., New Haven, Conn.
R. I. Tool Co., Providence, R. I.
Scranton Forging Co., Scranton, Pa.
Seward, M. Son Co., New Haven, Ct.
Springfield Drop Forging Co., Springfield, Mass.
Strieby & Foote Co., Newark, N. J.
Transue & Williams Co., Alliance, O.
Williams, J. H. & Co., Brooklyn, N. Y.
Wyman & Gordon, Worcester, Mass.
- Drop Hammers**
Billings & Spencer Co., Hartford, Conn.
Williams, White & Co., Moline, Ill.
- Drop Presses**
Morse, E. J. Mch. Co., Waterbury, Ct.
Miner & Pack Mfg. Co., New Haven, Ct.
Mossberg & Granville Mfg. Co., Providence, R. I.
Vulcan Iron Works, Chicago, Ill.
- Dumb Waiters**
Energy Elevator Co., Philadelphia, Pa.
Spindel, J. G., Reading, Pa.
Storm Mfg. Co., Newark, N. J.
Variety Machine Co., Warsaw, N. Y.
- Dump Cars**
Atlas Bolt & Screw Co., Cleveland, O.
- Dynamoes**
Eddy Electric Mfg. Co., Windsor, Conn.
General Electric Co., Schenectady, N. Y.
Hansen & Van Winkle Co., Newark, N. J.
Mayer, M. M. Electric Co., 2d Ave. and 121st St., N. Y.
New England Motor Co., Lowell, Mass.
Stewart Electrical Co., Cincinnati, O.
Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.
Zucker & Lovett & Loeb Co., 526-530 W. 25th St., New York.
- Eave Trough Hangers**
Berger Bros. Co., Philadelphia, Pa.
Heartley Machine Variety Iron & Tool Works, Toledo, O.
Oatman Bros., Medina, O.
- Edge Tools**
Buck, Chas., Millbury, Mass.
Buck Bros. Millbury, Mass.
Ferro-Carbon Castings Co., Phila., Pa.
White, L. & J. Co., Buffalo, N. Y.
- Egg Beaters**
Lyons, Neilsen, Albany, N. Y.
Suganard Co., Boston, Mass.
Taplin Mfg. Co., Forestville, Conn.
- Egg Opener**
Hartigan, W. R., Collinsville, Ct.
- Electric Bells and Supplies**
Ostrander, W. R. & Co., 24 Fulton St.
- Electric Controllers**
Electric Controller & Supply Co., Cleveland, O.
- Electric Lighting and Power Apparatus**
Eddy Electric Mfg. Co., Windsor, Conn.
General Electric Co., Schenectady, N. Y.
- Electrical Apparatus**
Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.
- Electrical Machinery**
Stewart Electrical Co., Cincinnati, O.
- Electrotype**
St. Louis Electrotype Foundry, St. Louis, Mo.
- Elevators, Makers of**
Eastern Machinery Co., New Haven, Ct.
Energy Elevator Co., Philadelphia, Pa.
Franklin Mach. Works, St. Paul, Minn.
Link-Belt Engineering Co., Phila., Pa.
Morse, Williams & Co., Phila., Pa.
Ridgway, Craig & Son Co., Coatesville, Pa.
Spindel, J. G., Reading, Pa.
Variety Machine Co., Warsaw, N. Y.
Warner Elevator Mfg. Co., Cincinnati, O.
- Elevator Buckets**
Clark, W. J. & Co., Salem, O.
Cleveland Elevator Bucket Co., Cleveland, O.
- Elevator Enclosures and Cabs**
Ludlow Saylor Wire Co., St. Louis, Mo.
- Emery**
Taitte Co., Stroudsburg, Pa.
- Emery Grinding Machinery**
Webster & Perks Tool Co., Springfield, Ohio.
- Emery Wheels**
American Emery Wheel Works, Providence, R. I.
Best, L. 45 Vesey St., N. Y.
Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.
Buffalo Emery Wheel Co., Buffalo, N. Y.
Diamond Mach. Co., Providence, R. I.
Nazel, John, Phila., Pa.
Northampton Emery Wheel Co., Leeds, Mass.
Norton Emery Wheel Co., Worcester, Mass.
Safety Emery Wheel Co., Springfield, O.
Springfield Mfg. Co., Bridgeport, Conn.
Sterling Emery Wheel Co., Tiffin, O.
Taitte Co., Stroudsburg, Pa.
Vitrified Emery Wheel Co., Westfield, Mass.
- Emery Wheel Dresser**
Chicago Screw Co., Chicago, Ill.
Dickinson, Thos. L., 45 Vesey St., N. Y.
- Engineers and Contractors**
Aiken, Henry, Pittsburgh, Pa.
Erikson, Edw. E., Pittsburgh, Pa.
Filer & Stowell Co., Milwaukee, Wis.
Forster-Miller Engineering Co., Pittsburgh, Pa.
Hevi & Patterson, Pittsburgh, Pa.
Reber, S. V. Co., Pittsburgh, Pa.
Kennedy, Julian, Pittsburgh, Pa.
Kennedy, Walter, Pittsburgh, Pa.
Lamond, David, Pittsburgh, Pa.
Laughlin, Alex. & Co., Pittsburgh, Pa.
- Engines, Gas**
Mietz, Aug., 138-139 Mott St., N. Y.
Northern Engineering Works, Detroit, Mich.
Ruger, J. W. Mfg. Co., Buffalo, N. Y.
Woolley Fdry. & Mch. Works, Anderson, Ind.
- Gasoline**
Charter Gas Engine Co., Sterling, Ill.
Ruger, J. W. Mfg. Co., Buffalo, N. Y.
Webber Gas & Gasoline Engine Co., Kansas City, Mo.
Watkins, F. M., Cincinnati, O.
Woolley Fdry. & Mch. Works, Anderson, Ind.
- Kerosene**
Mietz, Aug., 138-139 Mott St., N. Y.
- Steam**
Allis, E. P. Co., Milwaukee, Wis.
Boston Blower Co., Hyde Park, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Filer & Stowell Co., Milwaukee, Wis.
Lefel, James & Co., Springfield, O.
Newport News Shipbuilding & Dry Dock Co., 1 Broadway, N. Y.
Sennett Geo. B. Co., Youngstown, O.
Southwick Fdry. & Mch. Co., Philadelphia, Pa.
Sturtevant, B. F. Co., Boston, Mass.
Totten & Hogg Iron & Steel Fdry. Co., Pittsburgh, Pa.
Wetherill, Robt. & Co., Chester, Pa.
- Engines, Marine**
Lake City Engineering Co., Erie, Pa.
- Engines, Second Hand**
Kverson, B. M., Pittsburgh, Pa.
- Enginers**
Muzford A., Hartford, Conn.
- Expanding Mandrels**
LeCount, Wm. G., So. Norwalk, Conn.
- Expansion Bolts**
Church, Isaac, Toledo, O.
McCabe Hanger Mfg. Co., 333-543 W. 23d St., N. Y.
Newhall, Henry B. Co., N. Y.
Seaman D. C. Co., Philadelphia, Pa.
Steward & Komaine Mfg. Co., Phila., Pa.
- Exporters**
Sheelby & Co., London, Eng.
- Farmers' Tools**
Champion Tool Co., Ltd., Conneaut Lake, Pa.
Heller Bros. & Co., Newark, N. J.
- Faucets**
Litchfield, J. M., 105 Beekman St., N. Y.
McKenna Bros. Brass Co., Ltd., Pittsburgh, Pa.
- Faucets, Wooden**
Boston & Lockport Block Co., Boston.
Sommer's, John, Son, Newark, N. J.
- Feed Cutters**
Salem, O.
- Feed Water Heaters and Purifiers**
Harrison Safety Boiler Works, Philadelphia, Pa.
Kelly, B. F. & Son, 91 Liberty St., N. Y.
National Pipe Bending Co., New Haven.
Patterson, F. L., 136 Liberty St., N. Y.
Taunton Locomotive Mfg. Co., Taunton, Mass.
Ward Heater Co., Detroit, Mich.
Webster, Warren & Co., Camden, N. J.
Whitlock Oil Pipe Co., Hartford, Ct.
- Feeding Attachment**
National Machine Tool Co., Cincinnati.
- Fencing, Iron and Wire**
Adam, W. J., Joliet, Ill.
American Steel & Wire Co., Chicago, Ill.
Barnum, E. T., Detroit, Mich.
Berthe, A., Jersey City, N. J.
Clinton Wire Cloth Co., Clinton, Mass.
DeKalb Fence Co., DeKalb, Ill.
Drivings Wire Fence Co., Anderson, Ind.
Ellis & Halfenbarger, Indianapolis, Ind.
Frost Wire Fence Co., Cleveland, O.
Gilbert & Bennett Mfg. Co., 44 Cliff St.
Hartman Mfg. Co., 389 Broadway, N. Y.
Kilmer Wire Mfg. Co., Chicago, Ill.
Kokomo Fence Mch. Co., Kokomo, Ind.
Ludlow Saylor Wire Co., St. Louis, Mo.
Ornamental Iron & Wire Co., Chattanooga, Tenn.
Rossman Woven Wire Fence Co., Rossman, N. Y.
Stewart Iron Works, Cincinnati, Ohio.
Up-to-date Mfg. Co., Terre Haute, Ind.
- Ferro-Chromium**
Willson Aluminum Co., 99 Cedar Street, N. Y.
- File Cutting Machinery**
Hess Machine Works, Phila., Pa.
- Files and Rasps**
Manufacturers of
Arcade File Works, Anderson, Ind.
Barnett, G. & H. Co., 41 & 43 Richmond Phila.
Boston, Henry & Sons, Inc., Phila., Pa.
Heiler Bros. Co., Newark, N. J.
McCaffrey File Co., Philadelphia.
Nicholson File Co., Providence, R. I.
Stokes Bros. Mfg. Co., Freehold, N. J.
- Filing Cabinets**
Globe-Wernicke Co., Cincinnati, O.
- Filters**
Scott, Wm. B. & Sons, Pittsburg, Pa.
- Finished Castings**
Franklin, H. H. Mfg. Co., Syracuse.
- Fire Brick**
Borgner, Cyrus, Philadelphia, Pa.
Gardner Bros., Cumberland, Md.
Haws, W. H. Fire Brick Co., Mt. Union.
Maurer, H. & Son, 420 E. 2d, N. Y.
Ostrander Fire Brick Co., Troy, N. Y.
Olesner & Lester, Toledo, O.
Presley Fire Brick Co., Taunton, Mass.
Valentine, M. D. & Bro. Co., Woodbridge.
- Fire Extinguishers**
International Sprinkler Co., Phila., Pa.
- Fire Place Goods**
Hovess, S. M. Co., Boston, Mass.
- Fire Sets**
Troy Nickel Works, Troy, N. Y.

- Fishing Tackle**
Dane, Stoddard & Co., Boston, Mass.
- Flexible Metallic Tubing**
Sharp, Klumph & Sisson Co., Chicago
- Flexible Shafting**
Chicago Flexible Shaft Co., Chicago, Ill.
Stow Flexible Shaft Co., Phila., Pa.
Stow Mfg. Co., Binghamton, N. Y.
- Flint and Emery Paper**
Baeder, Adamson & Co., Phila., Pa.
- Floor and Ceiling Plates**
Coddling Mfg. Co., Bristol, Conn.
- Floor Hinge**
Lawson Mfg. Co., Milwaukee, Wis.
- Flue Cleaners**
Jackson Flue Scraper Co., Jackson, N. Y.
Jarecki Mfg. Co., Erie, Pa.
- Fly Killers**
Bigelow, J. F., Worcester, Mass.
- Fly Traps**
Meyers, Fred. J. Mfg. Co., Hamilton, O.
- Foot Power Emery Wheels**
Buffalo Emery Wheel Co., Buffalo, N. Y.
- Foot Rests**
Star Heel Plate Co., Newark, N. J.
- Forges, Portable, &c.**
Bradley Co., Syracuse, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Fairbanks Co., 511 Broadway, N. Y.
Starveant, B. F. Co., Boston, Mass.
- Forgings, Iron and Steel**
Baker, Jas. H. Mfg. Co., Pittsburgh, Pa.
Bethlehem Steel Co., S. Bethlehem, Pa.
Eastern Forge Co., Boston, Mass.
Frankford Steel Co., Phila., Pa.
Hay-Rudden Mfg. Co., Brooklyn, N. Y.
Otis Steel Co., Ltd., Cleveland, Ohio.
Pittsburgh Star, Knife & Machine Co., Pittsburgh, Pa.
Titusville Forge Co., Titusville, Pa.
Vulcanus Forging Co., Cleveland, O.
- Forks, Hay and Manure**
Continental Tool Co., Frankfort, N. Y.
Fly Hoe & Fork Co., St. Johnsbury, Vt.
Iowa Farming Tool Co., Ft. Madison, Ia.
Terre Haute Shovel & Tool Co., Terre Haute, Ind.
Withington & Cooley Mfg. Co., Jackson, O.
- Foundry Facings**
Cleveland Facing Mill Co., Cleveland, O.
Obermayer, S. Co., Cincinnati, O.
- Foundry Lamps**
Forest City Fdy. & Mfg. Co., Cleveland, O.
Paxson, J. W. Co., Phila., Pa.
- Foundry Supplies**
Cleveland Facing Mill Co., Cleveland, O.
Gilmour, J., Bennett Building, N. Y.
Obermayer, S. Co., Cincinnati, Ohio.
Osborn Mfg. Co., Cleveland, O.
Paxson, J. W. Co., Phila., Pa.
Pointer & Lester, Toledo, O.
- Four-Head Milling Machines**
Ingersoll Milling Machine Co., Rockford, Ill.
- Friction Clutches**
Eastern Machinery Co., New Haven, Ct.
Hess, Snyder & Co., Massillon, O.
- Furnaces, Foundry**
Byram & Co., Detroit, Mich.
- Furnaces, Oil, Gas and Coal**
Rockwell Engineering Co., 26 Corlandt St., N. Y.
- Fuses**
Ensign Blackford & Co., Simsbury, Ct.
- Gages**
Crosby Steam Gage & Valve Co., Boston.
- Galvanized Ware**
Keen & Hazerty Mfg. Co., Baltimore.
- Galvanizing**
Blackman & King, 801 Greenwich St., N. Y.
Cleveland Galvanizing Works, Cleveland, O.
Embley Pipe Bending & Supply Co., Brooklyn, N. Y.
- Galvanizing Process**
U. S. Electro Galvanizing Co., 348 Broadway, N. Y.
- Garden Rakes**
Cronk Hanger Co., Elmira, N. Y.
Jenkins Iron & Tool Co., Howard, Pa.
- Garden Tools**
Withington & Cooley Mfg. Co., Jackson, O.
- Gas Compressor**
Uehling, Seibert & Co., Ltd., Carlstadt, N. J.
- Gas Compressors**
Norwalk Iron Works Co., So. Norwalk, Ct.
- Gas Furnaces**
Am. Gas Furnace Co., 23 John St., N. Y.
Chicago Flexible Shaft Co., Chicago, Ill.
- Gas Lamps**
Imperial Lamp Co., Chicago, Ill.
- Gaskets, Iron**
Smooth On Mfg. Co., Jersey City, N. J.
- Gas Producers**
Duff Patents Co., Allegheny, Pa.
Smethley, S. R. Co., Inc., Pittsburgh, Pa.
Swindell, W. & Bro., Pittsburgh, Pa.
- Gas Stoves**
Reineke, Wilson Co., Pittsburgh, Pa.
- Gauges, Rolling Mill**
Haines Gauge Co., Philadelphia, Pa.
- Gears**
Boston Gear Works, Boston, Mass.
Buffalo Gear & Pattern Works, Buffalo, N. Y.
Clason Tool Co., Rochester, N. Y.
Morse, Williams & Co., Phila., Pa.
Nuttall, R. D. Co., Pittsburgh, Pa.
Poole, Robt. Son & Co., Baltimore, Md.
- Gears, Rawhide**
Horsburgh & Scott, Cleveland, Ohio.
- Gear Cutters**
Becker Iron and Milling Machine Co., Hyde Park, Mass.
Bulman, F. H. & Co., Cleveland, O.
Gould & Eberhardt, Newark, N. J.
Whitton, D. E. Mch. Co., New London, Conn.
- Gear Patterns**
Buffalo Gear & Pattern Works, Buffalo, N. Y.
Wetstone Elec. & Mfg. Co., Pittsburgh, Pa.
- Gimlets**
Noton Mfg. Co., Chester, Conn.
- Glass Cutters**
Barrett, W. L., Bristol, Conn.
Bulman, F. H. & Co., Cleveland, O.
Monce, S. G., Unionville, Conn.
Smith & Hemenway Co., 296 Broadway, N. Y.
- Glass Unting Boards**
Lufkin Rule Co., Saginaw, Mich.
- Gline**
Baeder, Adamson & Co., Phila., Pa.
- Golf Goods**
Bridgeport Gun Implement Co., 812 Broadway, N. Y.
- Grass Hooks**
Wallingford Mfg. Co., Wallingford, Vt.
- Grates, Rocking**
Sonnelt, Geo. & Co., Youngstown, O.
- Grease, Axle**
Snow Flake Axle Grease Co., Boston.
- Grinding and Polishing Mchs.**
American Emery Wheel Works, Providence, R. I.
Barnes, W. F. & John Co., Rockford, Ill.
Besly, Chas. H. & Co., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Mach. Co., Cincinnati, O.
Diamond Mach. Co., Providence, R. I.
Gorton, Geo. Mach. Co., Racine, Wis.
Landis Tool Co., Waynesboro, Pa.
Northampton Emery Wheel Co., Leeds, Mass.
Norton Emery Wheel Co., Worcester, Mass.
- Grinding Stones**
Cleveland Stone Co., Cleveland, O.
- Grubbing Machine**
New Century Mfg. Co., 43 E. 8th St., N. Y.
- Gun Implements**
Union Hardware Co., Torrington, Conn.
- Guns**
Harrington & Richardson Arms Co., Worcester, Mass.
Johnson, Iver Arms & Cycle Works, Fitchburg, Mass.
Marlin Fire Arms Co., New Haven, Ct.
Remington Arms Co., 315 Broadway, New York.
- Hack Saws**
Diston, Henry & Sons, Inc., Phila., Pa.
Goodell-Pratt Co., Greenfield, Mass.
Springfield Machine Screw Co., Springfield, Mass.
Starrett, L. S. Co., Athol, Mass.
- Hack Saw, Power**
Patterson Tool & Supply Co., Dayton, O.
- Hammers**
Heller Bros. Co., Newark, N. J.
Logan & Strobbridge Iron Co., New Brighton, Pa.
- Hammers, Pneumatic**
Standard Pneumatic Tool Co., Chicago.
- Hammerheads**
Palmer, I. E., Middletown, Conn.
Bicknell Hdw. Co., Janesville, Wis.
- Hand Screws**
Bliss, R. Mfg. Co., Pawtucket, R. I.
- Handle Machinery**
Defiance Machine Works, Defiance, O.
- Hangers, Barn Door**
Myers, F. E. & Bro., Ashland, O.
- Hangers, Door**
Chicago Spring Butt Co., Chicago, Ill.
Coburn Trolley Track Mfg. Co., Holyoke, Mass.
- Hangers, Shafting**
Cronk Hanger Co., Elmira, N. Y.
Lane Bros., Poughkeepsie, N. Y.
Lawrence Bros., Sterling, Ill.
Louden Machinery Co., Fairfield, Iowa.
McCabe Hanger Mfg. Co., 533-543 W. 22d St., N. Y.
McKinney Mfg. Co., Allegheny, Pa.
Ney Mfg. Co., Canton, Ohio.
Stowell Mfg. & Foundry Co., So. Milwaukee, Wis.
Wilcox Mfg. Co., Aurora, Ill.
- Hangers, Storm Window and Screen**
Phonix Mfg. Co., Milwaukee, Wis.
- Hardware Comm'n Merchants**
Graham, John H. & Co., 113 Chambers St., N. Y.
Hungerford, U. T., Brass & Copper Co., 121 W. 23rd St., N. Y.
- Hardware Jobbers**
Fritzlauff, John Hdw. Co., Milwaukee.
Supplee Hdw. Co., Phila., Pa.
Trout, Geo. W. & Co., Chicago, Ill.
- Hardware Manufacturers**
Arcade Mfg. Co., Freeport, Ill.
Central Hardware Co., Phila., Pa.
Logan & Strobbridge Iron Co., New Brighton, Pa.
Millers Falls Co., 28 Warren St., N. Y.
Ney Mfg. Co., Canton, Ohio.
Nicol & Co., Chicago, Ill.
Parker, Chas. Co., Meriden, Conn.
Peck, Shaw & Wilcox Co., 21 Murray St., N. Y.
Russell & Erwin Mfg. Co., New York.
Southington Cutlery Co., Southington, Conn.
Stanley Works, New Britain, Conn.
Union Mfg. Co., 103 Chambers St., N. Y.
Van Wagener & Williams Hdw. Co., Cleveland, O.
Wrightsville Hdw. Co., Wrightsville, Pa.
- Hardware Mfrs.' Agents**
Graham, John H. & Co., 113 Chambers St., N. Y.
Wiebusch & Hilger, Ltd., 9-15 Murray St., N. Y.
- Hardware Shelving**
Warren, J. D. Mfg. Co., Chicago, Ill.
- Hardware Specialties**
Acme Shear Co., Bridgeport, Conn.
Berger Bros. Co., Philadelphia, Pa.
Enterprise Mfg. Co., of Pa., Phila., Pa.
Graham, John H. & Co., 113 Chambers St., N. Y.
Kilbourne Mfg. Co., Fair Haven, Vt.
Kohler, F. E. & Co., Canton, O.
Pleuger & Henger Mfg. Co., St. Louis.
Scranton & Co., The, New Haven, Ct.
Smith & Egge Mfg. Co., Bridgeport, Ct.
- Harness Snaps**
Covert Mfg. Co., West Troy, N. Y.
Covert's Saddlery Wks., Farmer, N. Y.
Imperial Bit & Snap Co., Racine, Wis.
- Haps and Staples**
McKinney Mfg. Co., Allegheny, Pa.
- Hatches**
Jenkins Iron & Tool Co., Howard, Pa.
- Hay Knives**
Clark & Parsons Co., E. Wilton, Me.
Ney Mfg. Co., Canton, Ohio.
- Hay Tools**
Louden Machinery Co., Fairfield, Iowa.
Myers, F. E. & Bro., Ashland, O.
Ney Mfg. Co., Canton, O.
- Heating and Ventilating Apparatus**
American Blower Co., Detroit, Mich.
Bayley, Wm. & Sons Co., Milwaukee, Wis.
Boston Blower Co., Hyde Park, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Perkins, B. F. & Son, Holyoke, Mass.
Starveant, B. F. Co., Boston, Mass.
- Heel Plates**
Star Heel Plate Co., Newark, N. J.
- Hinges**
Jenkins Iron & Tool Co., Howard, Pa.
Lawrence Bros., Sterling, Ill.
McKinney Mfg. Co., Allegheny, Pa.
Shelby Spring Hinge Co., Shelby, O.
Stanley Works, New Britain, Conn.
Tiebout, W. & J., 118 Chambers St., N. Y.
- Hitching Posts**
Hartman Mfg. Co., 309 Broadway, N. Y.
- Hoes, Garden, Planters', &c.**
Continental Tool Co., Frankfort, N. Y.
Iowa Farming Tool Co., Fort Madison, Iowa.
Jenkins Iron & Tool Co., Howard, Pa.
- Hoists, Air**
Pedrick & Ayer Co., Philadelphia, Pa.
Ridgway, Craig & Son Co., Coatesville, Pa.
Whitling Foundry Equipment Co., Harvey, Ill.
- Hoists, Chain and Rope**
Box, Alfred & Co., Philadelphia, Pa.
Dunn, Jas. P., Cleveland, O.
Eckstein, C. G., 249 Centre St., N. Y.
Fulton Iron & Engine Works, Detroit, Mich.
Harrington, E. & Son Co., Phila., Pa.
McCoy, Jos. F. & Co., 26 Warren St., Reading, Pa.
Speidel, J. G., Reading, Pa.
- Hoisting Machines**
Eastern Machinery Co., New Haven, Ct.
Linwood Mfg. Co., 96 Liberty St., N. Y.
- Hollow Mill**
Geometric Drill Co., Westville, Conn.
- Hollow Ware**
Avery Stamping Co., Cleveland, Ohio.
Cleveland Stamping & Tool Co., Cleveland, O.
New York Stamping Co., Brooklyn, N. Y.
Rogers, Jno. M. Boat-Gauge & Drill Works, Gloucester, City, N. J.
- Horse Nails**
Capewell Horse Nail Co., Hartford, Ct.
Mooney, W. M. & Co., Ausable Chas., N. Y.
- Horse and Mule Shoes**
American Steel & Wire Co., Chicago, Ill.
Burden Iron Co., Troy, N. Y.
Hollow Grip Horse Shoe Co., Chicago.
Phoenix Horse Shoe Co., Poughkeepsie, Rhode Island.
Perkins Horse Shoe Co., Providence, R. I.
- Hose**
Boston Belting Co., Boston, Mass.
Peerless Rubber Mfg. Co., 16 Warren Street, New York.
- Hose Couplings**
Clark, W. J. & Co., Salem, Ohio.
- Hose Coupling, Air**
Pedrick & Ayer Co., Philadelphia, Pa.
- Hose Washers**
Candell, H. O., Bridgeport, Conn.
- Housing Specialties**
Lloyd Mfg. Co., Minneapolis, Minn.
Williams, A. C., Ravenna, O.
- Hydraulic Jacks**
Dudgeon, Richard, 24 Columbia St., N. Y.
Henderer, A. L. Sons, Wilmington, Del.
Watson-Stillman Co., 394 E. 43d St., N. Y.
- Hydraulic Machinery**
Watson-Stillman Co., 394 E. 43d St., N. Y.
- Hydraulic Presses**
Cornell, J. B. & J. M., 26th St. and 11th Ave., N. Y.
- Hydraulic Tools**
Watson-Stillman Co., 394 E. 43d St., N. Y.
Wood, R. D. & Co., Phila., Pa.
- Ice Cream Freezers**
North Bros. Mfg. Co., Philadelphia, Pa.
White Mountain Freezer Co., Nashua, N. H.
- Ice Creepers**
Erie Trucking Glove Co., Bucyrus, O.
- Ice Making Machinery**
York Mfg. Co., York, Pa.
- Ice Picks**
Erie Specialty Co., Erie, Pa.
- Ice Shredders**
Enterprise Mfg. Co., Philadelphia, Pa.
Erie Specialty Co., Erie, Pa.
- Ice Tools**
Gerlach, Peter & Co., Cleveland, O.
Williams, A. C., Ravenna, O.
Wood, Wm. T. & Co., Arlington, Mass.
- Importers**
Johnson, Iacham & Morris, Manchester, England.
Jenkins Bros., New York.
Watson, N. A., Erie, Pa.
- Ink Stands**
Sillim, Fred'k W., Chester, Conn.
- Insurance, Boiler**
Hartford Steam Boiler Inspection and Insurance Co., Hartford, Conn.
- Iron and Steel, Swedish**
Harvey, Arthur C. Co., Boston, Mass.
Lillenberg, N., 150 Broadway, N. Y.
Milne, A. & Co., 1 Broadway, N. Y.
- Iron Commission Brokers**
Cabeen & Co., Phila., Pa.
Cotton, Barclay W. & Co., Phila., Pa.
Cox, Justice, Jr. & Co., Ltd., Phila., Pa.
Etting, Edw. J., Philadelphia.
Keeler, Jerome & Co., Philadelphia.
Law, Ernest & Co., Philadelphia.
Lea, J. Tatnell & Co., Philadelphia.
Mohr, J. L., 480 Walnut St., Philadelphia.
Wister, L. R. & Co., Phila., Pa.
- Iron Manufacturers**
Newkirk, J. B. & Co., Philadelphia, Pa.
Republic Iron & Steel Co., Chicago, Ill.
- Iron Merchants**
Hole, Ross & Co., Pittsburgh, Pa.
Cotton, Barclay W. & Co., Phila.
Cunliffe, R. M., Phila., Pa.
Law, Ernest & Co., Phila., Pa.
McInnes, E. & Co., Phila., Pa.
Ogden & Wallace, 577-583 Greenwich St., N. Y.
- Iron, Potts, & Co., 29 Broadway, N. Y.**
Potts, Horace T. & Co., Phila., Pa.
Wallace, Wm. H. & Co., 66 B'way, N. Y.
Wheeler, Mifflin & Co., Phila., Pa.
Wilson, K. H. & Co., Philadelphia.
- Wheelock-Lovejoy & Co., New York and Boston.**
- Iron, Galvanized Sheet—See Sheets, Galvanized.**
- Iron Sheet—See Sheets, Iron and Steel.**
- Iron Ore**
Nicol, B. & Co., 59-61 Wall St., N. Y.
Pilling & Crane, Phila., Pa.
Pullman, J. Wesley, Phila., Pa.
- Ironwork, Ornamental**
Adam, W. J., Joliet, Ill.
Barnum, E. T., Detroit, Mich.
Berthe, A., Jersey City, N. J.
Ornamental Iron & Wire Co., Chattanooga, Tenn.
Van Dorn Iron Wks. Co., Cleveland, O.
- Jewelry**
Myers, S. F. Co., 49-50 Maiden Lane, N. Y.
- Job Lots, Hardware**
Chicago House Wrecking Co., Chicago, Ill.
- Joist Hanger**
Van Dorn Iron Wks. Co., Cleveland, O.
- Kegs**
Bell, Edwin & Sons Co., Youngstown, O.
- Keys, Machine**
Morton Mfg. Co., Muskegon Heights, Mich.
- Key Seaters**
Baker Bros., Toledo, Ohio.
- Key Split and Riveted**
Rollinger Fence Co., Greenville, O.
- Keyway Cutter**
Mor on Mfg. Co., Muskegon Heights, Mich.
- Knife and Tool Grinder**
Union Mfg. Co., Buffalo, N. Y.
- Knives**
Jackson Knife & Shear Co., Fremont, O.
Kimball, C. J. Co., Bennington, N. H.
- Laboratory Outfits**
Elmer & Amend, New York.
- Ladders**
Handy Ladder Works, Cleveland, O.
- Lamps**
Imperial Gas Lamp Co., Chicago, Ill.
Chicago Solar Light Co., Chicago, Ill.
- Lamps, Gasoline**
Merkel, H. S., St. Louis, Mo.
Noite Brass Co., Springfield, O.
- Lamp Stoves**
Litchfield, J. M., 105 Beekman St., N. Y.
- Laths and Lath Stands**
Kupferle, Jno. C., St. Louis, Mo.
Pleuger & Henger Mfg. Co., St. Louis, Mo.
Stowell Mfg. & Foundry Co., So. Milwaukee, Wis.
- Lathe Bogs**
LeCount, Wm. G. So. Norwalk, Conn.
- Lathes**
American Tool Works Co., Cincinnati, Ohio.
Barker-Chard Mch. Tool Co., Cincinnati, Ohio.
Barnes, B. F. & Co., Rockford, Ill.
Bradford Machine Tool Co., Cincinnati.
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Mach. Tool Co., Bridgeport, Ct.
Davis, W. P. Machine Co., Rochester, N. Y.
Draper Mch. Tool Co., Worcester, Mass.
Fish, H. C. Mch. Wks., Worcester, Mass.
Harrington, E. & Son Co., Phila., Pa.
Johnson, Israel H., Jr. & Co., Phila., Pa.
Jones & Lamson Mch. Co., Springfield, Vt.
Lodge & Shipley Mch. Tool Co., Cincinnati, O.
McCabe, J. J., 14 Dey St., N. Y.
New Haven Mfg. Co., New Haven, Ct.
Pond Machine Tool Co., Mainfield, N. J.
Potter & Johnson Co., Pawtucket, R. I.
Pratt & Whitney Co., Hartford, Conn.
Prentice Bros., Worcester, Mass.
Schumacher & Boye, Cincinnati, O.
Sebastian Lathe Co., Cincinnati, O.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.
Sik, Anderson Co., Cincinnati, Ohio.
Young, W. C. Mfg. Co., Worcester, Mass.
- Lathe Tools**
Hill Tool Co., Anderson, Ind.
- Lathing, Wire**
Clinton Wire Cloth Co., Clinton, Mass.
N. J. Wire Cloth Co., Trenton, N. J.
Wright & Colton Wire Cloth Co., Worcester, Mass.
- Lawn Mowers**
Hill Mfg. Co., Springfield, Mass.
Supplee Hardware Co., Phila., Pa.
- Lawn Mower Sharpeners**
Wilcox Mfg. Co., Aurora, Ill.
- Lawn Rakes**
Kohler, F. E. & Co., Canton, O.
- Lawn Sprinklers**
Kupferle, Jno. C., St. Louis, Mo.
McGowan, John H. Co., Cincinnati, O.
Pleuger & Henger Mfg. Co., St. Louis, Mo.
- Lemon Squeezers**
Hazen & Reid, Troy, N. Y.
Tucker & Dorsey Mfg. Co., Indianapolis, Ind.
Williams, A. C., Ravenna, O.
- Link Belting**
Hubb Malleable Co., Detroit, Mich.
Locke & Teel Belt Co., Bridgeport, Conn.
- Locks and Knobs**
Central Hardware Co., Phila., Pa.
Norwalk Lock Co., So. Norwalk, Conn.
Reading Hdw. Co., Reading, Pa.
Russell & Erwin Mfg. Co., New York.
U. S. Steel Lock Co., Clinton, Iowa.
- Locomotives**
Everson, R. M., Pittsburgh, Pa.
- Loading Tools**
Gerlach, Peter & Co., Cleveland, Ohio.
- Lubricants**
Dixon, Jos., Crutchee Co., Jersey City.
Snow Flake Axle Grease Co., Boston.
- Lumbering Tools**
Morley Bros., Saginaw, Mich.
- Lunch Boxes**
Seaver Mfg. Co., Boston, Mass.
- Machinery**
Acme Machinery Co., Cleveland, Ohio.
Affleck, Geo. E., 109 Liberty St., N. Y.
Alax Mfg. Co., Cleveland, Ohio.

American Tool Wks. Co., Cincinnati, O.
 Baird, C. Machinery Co., Pittsburgh, Pa.
 Barnes, W. F. & John Co., Rockford, Ill.
 Bausch & Lomb Opt. Co., Springfield, Mass.
 Becker-Brainard Milling Mach. Co., Hyde Park, Mass.
 Bliss E. W. Co., Brooklyn, N. Y.
 Bowler, Geo. H., Cleveland, O.
 Briggs, Martin, 12 Broadway, N. Y.
 Brown & Sharpe Mfg. Co., Providence.
 Bullard Mch. Tool Co., Bridgeport, Ct.
 Carlin Machinery & Supply Co., Allegheny, Pa.
 Carlin's Sons Thos., Allegheny, Pa.
 Cincinnati Milling Mach. Co., Cincinnati, O.
 Cincinnati Planer Co., Cincinnati, O.
 Cincinnati Shaper Co., Cincinnati, O.
 Cook, T. W. G., 6 Reade St., N. Y.
 Cornell, J. B. & J. M., 26th St. and 11th Ave., New York City.
 Davis, W. P. Machine Co., Rochester, N. Y.
 Dawson, A. L. & Co., Chicago, Ill.
 Dawson & Goodwin, Chicago, Ill.
 Detrick & Harvey Mch. Co., Baltimore, Md.
 Diamond Drill & Mch. Co., Birdsboro, Pa.
 Doan, J. B. & Co., Chicago, Ill.
 Draper Mach. Tool Co., Worcester, Mass.
 Du Bois Iron Works, Du Bois, Pa.
 Farrell Fdry & Mch. Co., Ansonia, Conn.
 Ferracute Machine Co., Bridgeport, N. J.
 Fish, H. C. Machine Works, Worcester, Mass.
 Fitchburg Machine Works, Fitchburg, Mass.
 Garvin Machine Co., Springfield and Varick Sts., N. Y.
 General Supply Co., 40 John St., N. Y.
 Geometric Drill Co., Westville, Conn.
 Gray, Robt. J., 524 E. 134th St., N. Y.
 Hannan & Finton, Springfield, Mass.
 Hendey Machine Co., Torrington, Conn.
 Hill, Henry F., Boston, Mass.
 Hill, Clarke & Co., Boston, Mass.
 Illinois Manufacturing Co., Chicago, Ill.
 Johnson, Israel H., Jr. & Co., Phila.
 Johnson, Wm. C. & Sons Mch. Co., St. Louis, Mo.
 Kaiser, A. V. & Co., Phila., Pa.
 Keagy & Lear Mch. Co., Coshocton, O.
 Lodge & Shipley Mch. Tool Co., Cin., O.
 Lund, S. T., Boston, Mass.
 McCabe, J. J., 14 Dey Street, N. Y.
 McDowell & Co., Pittsburgh, Pa.
 McDowell Stocker & Co., Chicago.
 Machinists' Supply Co., Rochester, N. Y.
 Manning, Maxwell & Moore, 85-89 Liberty St., N. Y.
 Manville, E. J. Mach. Co., Waterbury, Ct.
 Marshall & Hushart Mch. Co., Chicago, Ill.
 Mossberg, Frank Co., Attleboro, Mass.
 National Machinery Co., Tiffin, Ohio.
 New Doty Mfg. Co., Janesville, Wis.
 New Haven Mfg. Co., New Haven, Conn.
 New York Machinery Depot, 178 Broadway, New York.
 Niles Tool Works Co., 138 Liberty St., N. Y.
 Nilson, A. H. Mch. Co., Bridgeport, Ct.
 Paradox Machinery Co., Chicago, Ill.
 Pennsylvania Machine Co., Phila., Pa.
 Phila. Machine Tool Co., Phila., Pa.
 Pittsburgh Mfg. Co., Pittsburgh, Pa.
 Pond Machine Tool Co., Plainfield, N. J.
 Poole, Robt. & Son Co., Baltimore, Md.
 Potter & Johnston Co., Pawtucket, R. I.
 Poulter & Co., Phila., Pa.
 Pratt & Whitney Co., Hartford, Conn.
 Prentice Bros., Worcester, Mass.
 Prentiss Tool & Supply Co., 115 Liberty St., N. Y.
 Rainier & Williams, Chicago, Ill.
 Reade, Wm. A. & Co., Cleveland, O.
 Seyfert's Sons L. F., Philadelphia, Pa.
 Sigourney Tool Co., Hartford, Conn.
 Silk, Anderson Co., Cincinnati, Ohio.
 Standard Machinery & Equipment Co., Cleveland, O.
 Thomas & Lowe Machinery Co., Providence, R. I.
 Toomey, Frank, Philadelphia, Pa.
 Waterbury Farrel Foundry & Mch. Co., Waterbury, Conn.
 Wetherill Robert & Co., Chester, Pa.
 Windsor Machine Co., Windsor, Vt.
 Worner, C. C. & Son, Detroit, Mich.
 York, S. M. Co., Cleveland, O.

Machinery, Wood Working
 American Mach. Co., Grand Rapids.
 DeLancey Machine Wks., DeLancey, O.
 Fay, J. A. & Egan Co., Cincinnati, O.

Machinery Springs
 Scott, Chas. Spring Co., Phila., Pa.

Machinery Builders
 Chapman, J. B. & Co., Springfield, Mass.

Machine Knives
 Lord, John, 558-562 Water St., N. Y.

Machine Needles
 Excelsior Needle Co., Torrington, Ct.

Machine Screws—See Screws Machine

Machine Screw Work
 Spencer Automatic Mch. Screw Co., Hartford, Conn.

Machine Tools—See Machinery

Machine Work
 Nuttall, R. D. & Co., Pittsburgh, Pa.

Machine Wrenches
 Billings & Spencer Co., Hartford, Conn.

Machinists' Scales
 Starratt, L. S. Co., Athol, Mass.

Machinists' Tools and Supplies
 Billings & Spencer Co., Hartford, Conn.
 General Supply Co., 40 John St., N. Y.
 Keystone Mfg. Co., Buffalo, N. Y.
 King, J. M. & Co., Watford, N. Y.

Magnetic Separators
 Cresson, Geo. V. Co., Phila., Pa.

Manganese Bronze
 Hungerford, U. T. Brass & Copper Co., 121 North St., N. Y.

Manufacturing Properties
 Harrisburg Fdry & Mch. Wks., Harrisburg, Pa.

Manufacturing Sites
 Hillman, J. H. & Co., Pittsburgh, Pa.

Manufacturing Sites
 Chicago, Milwaukee & St. Paul R. R., Chicago, Ill.
 Louisville & Nashville R. R., Louisville, Ky.
 Southern Railway Co., Washington, D. C.

Measuring Machines
 Rogers, Jno. M. Best, Gauge & Drill Wks., Gloucester City, N. J.

Meat Choppers
 Brown, J. H., 160 Duane St., N. Y.
 Enterprise Mfg. Co., Pa., Phila., Pa.
 Peck, Stow & Wilcox Co., 37 Murray St., New York.

Streeter, N. R. & Co., Rochester, N. Y.
 Woodruff, O. D., Potstow, Pa.

Metal Prokers
 American Metal Co., 52 Broadway, N. Y.

Metals
 Hendricks Bros., 49 Cliff St., N. Y.
 Hoteller, Theo. & Co., Buffalo, N. Y.
 Hungerford, U. T. Brass & Copper Co., 121 North St., N. Y.
 Rutter, A. T., 256 Broadway, N. Y.
 U. S. Metals Selling Co., 11 Broadway, N. Y.

Metal Polish
 Hoffman, Geo. W., Indianapolis, Ind.

Metal Spinning
 Goodwin & Kintz Co., Winsted, Conn.

Metal Wheels
 Electric Wheel Co., Quincy, Ill.

Milling Machines
 Agassiz Co., Dubuque, Iowa.
 Becker-Brainard Milling Machine Co., Hyde Park, Mass.
 Brown & Sharpe Mfg. Co., Providence.
 Carter & Hakes Mch. Co., Winsted, Ct.
 Cincinnati Milling Mach. Co., Cin., O.
 Fox Machine Co., Grand Rapids, Mich.
 Garvin Machine Co., Spring and Varick Sts., N. Y.
 Ingersoll Milling Mach. Co., Rockford, Ill.
 Niles Tool Works Co., 138-139 Liberty St., N. Y.
 Shuster, F. R. Co., New Haven, Conn.
 Thurston Mfg. Co., Providence, R. I.

Mining Knives
 Bishop, Geo. H. & Co., Cincinnati, O.
 Palmer Hdw. Mfg. Co., Troy, N. Y.

Mining Machinery
 Ellis, E. P. Co., Milwaukee, Wis.
 Hand Drill Co., 125 Broadway, N. Y.

Mining Screens
 Harrington & King Perforating Co., Chicago, Ill.
 Howard & Morse, 45 Fulton St., N. Y.
 Michigan Wire Cloth Co., Detroit, Mich.
 Thomson Bros. & Co., Lowell, Mass.

Molding Machines
 Adams, O., Dubuque, Iowa.
 Maywood Fdry & Mch. Co., Chicago.
 Primmore, Henry E., Chicago, Ill.

Motor Fans
 Hungerford, U. T. Brass & Copper Co., 121 North St., N. Y.

Motors, Air
 Stow Flexible Shaft Co., Phila., Pa.

Motors, Electric
 Eddy Electric Mfg. Co., Windsor, Conn.
 General Electric Co., Schenectady, N. Y.
 Stewart Electrical Co., Cincinnati, O.
 Sturtevant, B. F. Co., Boston, Mass.
 Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.

Music Wire
 Felten & Guilleaume Carlswerk, Mulheim am Rhein, Germany.

Nail Clippers
 Cook, H. C. Co., Ansonia, Conn.

Nail Machinery
 Pittsburgh Mfg. Co., Pittsburgh, Pa.

Nail Pullers
 Hagen & Reid, Troy, N. Y.
 Keaton & Co., The, New Haven, Conn.
 Smith & Hemenway Co., 236 Broadway, N. Y.

Same Plates, Machinery
 Murdoch Parlor Grate Co., Boston, Mass.

Natural Gas Pumps
 American Iron Wks. Co., So. Norwalk, Ct.

Nickel Platers' Supplies
 Eddy Electric Mfg. Co., Windsor, Conn.
 Hanson & Van Winkle Co., Newark, N. J.
 Zucker & Levett & Loeb Co., 326-330 W. 25th St., New York.

Nickeloid
 American Nickeloid Co., Peru, Ill.

Norway Shapes
 Rowland, William & Harvey, Frankford, Philadelphia.

Novelities, Gold and Silver Plated
 Benedict, M. S. Mfg. Co., E. Syracuse, N. Y.

Nuts—See Bolts

Nuts, Self-Locking
 National Elastic Nut Co., Milwaukee, Wis.

Nut Machines
 Dunham Nut Co., Unionville, Conn.

Oil Burners
 Burns, R. J. Carbon Burner Co., Fort Plain, N. Y.

Oil Burning Appliances
 Rockwell, Engineering Co., 26 Cortlandt St., N. Y.

Oil Extractor
 Reed & Curtis Mch. Screw Co., Worcester, Mass.

Oil Heaters—See Oil Stoves.

Oil Stoves—(See Stoves Oil, Vapor and Gasoline)

Oilers
 Bay State Stamping Co., Worcester, Mass.
 Gem Mfg. Co., Pittsburgh, Pa.
 Hammer & Co., Branford, Conn.
 Stoutenburg Mfg. Co., Kellsburg, Ill.
 Willmot & Hobbs Mfg. Co., Bridgeport, Conn.

Oilless Bearings
 North American Metalline Co., Long Island City, N. Y.

Ore Breakers
 Autman Co., Canton, O.
 Cresson, Geo. V. Co., Phila., Pa.

Ores
 Blair, Reed & Co., Pittsburgh, Pa.
 Samuel, Frank, Philadelphia, Pa.
 Wieter, Francis, Philadelphia, Pa.

Ovens, Portable
 Hodge, G. S. Co., Burlington, Vt.

Ox Sheds
 Scranton Forging Co., Scranton, Pa.
 Woodruff, Walter W. & Sons, Mt. Carmel, Conn.

Packing
 Boston Belting Co., Boston, Mass.
 Morrison, Robert, St. Louis, Mo.
 Peerless Rubber Mfg. Co., 16 Warren Street, N. Y.

Packing, Iron
 Smooth On Mfg. Co., Jersey City, N. J.

Paddocks
 Graham, John H. & Co., 113 Chambers Street, New York.

Paints
 Dixon, Jos. Crucible Co., Jersey City.
 Standard Paint Co., 77-79 John St., N. Y.

Pants Stretcher
 Covert Mfg. Co., West Troy, N. Y.

Patent Solicitors
 Hoepel & Baegener, 280 Broadway, N. Y.
 Howson & Howson, Philadelphia and Washington.
 Stocking, E. B., Washington, D. C.

Patterns
 Balkwill Pattern Wks., Cleveland, O.
 Buffalo Gear & Pattern Works, Buffalo, N. Y.
 Norwalk Pattern & Mfg. Co., So. Norwalk, Conn.

Pattern Letters
 Jutler, A. G., 103 Beekman St., N. Y.
 Cleveland Galvanizing Works, Cleveland, O.

Pattern Making Machinery
 American Mch. Co., Grand Rapids.

Perforated Metal
 Clinton Wire Cloth Co., Clinton, Mass.
 Erdle & Schenck, Rochester, N. Y.
 Harrington & King Perforating Co., Chicago, Ill.
 Hungerford, U. T. Brass & Copper Co., 121 North St., N. Y.

Phosphor Bronze
 Hungerford, U. T. Brass & Copper Co., 121 North St., N. Y.
 Phosphor Bronze Smelting Co., Limited, Philadelphia.

Phosphor Tin
 Phosphorized Metal Co., Philadelphia.

Pile Hauling
 Halk & Naumann, 518 Pearl St., N. Y.
 Syracuse Smelting & Refining Co., Syracuse, N. Y.

Picture Wire
 One-way Mills Co., Norwich, Conn.

Pig Casting Machines
 H. Patterson, Pittsburgh, Pa.

Pig Iron
 Alabama Consolidated Coal & Iron Co., Birmingham, Ala.
 Baird, C. H. & Co., Phila., Pa.
 Cherry Valley Iron Co., Pittsburgh, Pa.
 D. H. & Co., Phila., Pa.
 Hickman, Williams & Co., Chicago, Ill.
 Houston, C. B. & Co., Philadelphia, Pa.
 Nicoll, B. & Co., 53-61 Wall St., N. Y.
 Republic Iron & Steel Co., Chicago.
 Samuel, Frank, Philadelphia, Pa.
 Slone-shield Steel & Iron Co., Birmingham, Ala.
 Snyder, W. P. & Co., Pittsburgh, Pa.
 Superior Charcoal Iron Co., Grand Rapids, Mich.
 Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
 Virginia Iron, Coal and Coke Co., Bristol, Va., Tenn.

Pig Iron Analysis
 Church, S. H., San Francisco, Cal.

Pig Iron Storage
 Am. Pig Iron Storage Warehouse Co., 4 Wall St., N. Y.

Pile Drivers
 Edson Mfg. Co., Boston, Mass.

Pile Piers
 Vulcan Iron Works, Chicago, Ill.

Pipe, Bent
 National Pipe Bending Co., New Haven, Conn.

Pipe, National
 National Tube Co., Pittsburgh, Pa.
 Whitlock, H. P. & Co., Hartford, Ct.

Pipe Coupling
 Williams, J. H. & Co., Brooklyn, N. Y.

Pipe Crimpers
 Herridge Shear Co., Sturgis, Mich.

Pipe Cutting and Threading Machines
 Armstrong Mfg. Co., Bridgeport, Conn.
 Bignal & Keeler Mfg. Co., Edwardsville, Ill.
 Curtis & Curtis, Bridgeport, Conn.
 Jarecki Mfg. Co., Erie, Pa.
 Merrill Mfg. Co., Toledo, O.
 Saunders' Sons, D., Yonkers, N. Y.

Pipe Fittings
 Prentiss Vise Co., 44 Barclay, N. Y.

Pipes, Fittings, Acc.
 Jarecki Mfg. Co., Erie, Pa.
 McNab & Harlin Mfg. Co., N. Y.

Pipe, Riveted Steel
 Pollock, W. B. Co., Youngstown, O.
 Scaife, Wm. R. & Sons, Pittsburgh.

Pipe Shafts
 Warren City Roller Works, Warren, O.

Pipe, Water and Gas
 Herdrie & Shear Co., Sturgis, Mich.

Pipe, Water and Gas
 Millar, C. & Son Co., Utica, N. Y.

Piston Rods, Tobia Bronze
 Ansonia Brass & Copper Co., 99 John St., N. Y.

Planers
 Stanley Rule & Level Co., N. Y.

Planers
 Amer. Tool Works Co., Cincinnati, O.
 Baird, U. Machinery Co., Pittsburgh, Pa.
 Batemer-Eames Tool Co., Cincinnati, O.
 Cincinnati Planer Co., Cincinnati, Ohio.
 Detrick & Harvey Mch. Co., Baltimore, Md.
 Draper Mch. Tool Co., Worcester, Mass.
 Pond Machine Tool Co., Plainfield, N. J.
 Whitcomb Mfg. Co., Worcester, Mass.
 Wilson, W. A., Rochester, N. Y.

Plated Ware
 International Silver Co., Meriden, Ct.
 Myers, S. F. Co., 48-50 Maiden Lane, N. Y.

Plates, Iron and Steel
 Jones & Laughlins, Ltd., Pittsburgh, Pa.
 Lukens Iron & Steel Co., Coatesville, Pa.
 Singer, Nimick & Co., Inc., Pittsburgh, Pa.
 Wood, Alan Co., Philadelphia.

Plate Iron Work
 Scaife, Wm. R. & Sons, Pittsburgh.

Plays
 Bridgeport Mfg. Co., Bridgeport, Conn.
 Cronk Hanger Co., Elmira, N. Y.
 Merrill, Chas. Broadway and Chambers St., N. Y.
 Utica Drop Forge & Tool Co., Utica, N. Y.

Pneumatic Tools
 Phila. Pneumatic Tool Co., Phila., Pa.
 Standard Pneumatic Tool Co., Chicago.

Pocket Knives
 Catawagus Cutlery Co., Little Valley, N. Y.
 Northfield Knife Co., Northfield, Conn.

Pokers and Lifters
 Troy Nickel Works, Troy, N. Y.

Polishing Wheels
 Divine Bros. Co., Utica, N. Y.

Portable Track
 Atlas Bolt & Screw Co., Cleveland, O.

Post Hole Diggers
 Kohler, F. E. & Co., Canton, O.
 Tucker & Dorsey Mfg. Co., Indianapolis

Poultry Fencing
 DeKalb Fence Co., DeKalb, Ill.

Poultry Nettings
 Gilbert & Bennett Mfg. Co., 44 Cliff St., N. Y.
 N. J. Wire Cloth Co., Trenton, N. J.
 Tyler, W. S. Co., Cleveland, O.
 Wright & Colton Wire Cloth Co., Worcester, Mass.

Power Hack Saws
 Hoefer Mfg. Co., Freeport, Ill.
 Patterson Tool & Supply Co., Dayton, O.

Power Hammers
 Healdy & Co., Boston, Mass.
 Bradley Co., Syracuse, N. Y.
 Diemel & Eisenhardt, Philadelphia.
 Dubuque Mch. Concern, Dubuque, Ia.
 Dupont Mfg. Co., St. Johnsbury, Vt.
 Hilbert-Freiberg Mch. Tool Co., Cincinnati, O.
 Kidder, R. E., Worcester, Mass.
 Miner & Peck Mfg. Co., New Haven, Ct.
 Scranton & Co., The, New Haven, Conn.

Power Transmitting Machinery
 Cresson, Geo. V. Co., Phila., Pa.
 Dodge Mfg. Co., Mishawaka, Ind.
 Norwalk Iron Wks. Co., So. Norwalk, Ct.

Pressed Metal Work
 Avery Stamping Co., Cleveland, Ohio.

Presses, Power
 Adriance Mach. Works, Brooklyn, N. Y.
 Bliss, E. W. Co., Brooklyn, N. Y.
 Cook, T. W. G., 6 Reade St., N. Y.
 Cross & Spels Mch. Co., Waterbury, Ct.
 Ferracute Mach. Co., Bridgeport, N. J.
 Hibbard, W. H., Brooklyn, N. Y.
 Hilles & Jones Co., Wilmington, Del.
 Keagy & Lear Mch. Co., Coshocton, O.
 Leffer, Chas. & Co., Brooklyn, N. Y.
 Manville, E. J. Mch. Co., Waterbury, Ct.
 Mossberg & Granville Mfg. Co., Providence, R. I.
 Niagara Machine & Tool Wks., Buffalo.
 Perkins Machine Co., Boston, Mass.
 Phila. Machine Tool Co., Phila., Pa.
 Rudolph & Krummel, Chicago, Ill.
 Shuster, F. B. Co., New Haven, Conn.

Projectiles
 National Tube Co., Pittsburgh, Pa.

Pruning Shears
 Henry J. T. Mfg. Co., Hamden, Conn.

Pulleys
 Amer. Pulley Co., Phila., Pa.
 Dodge Mfg. Co., Mishawaka, Ind.
 Eastern Machinery Co., New Haven, Ct.
 Evans, G. F., Boston, Mass.
 Hess Snyder & Co., Massillon, O.
 Jones & Laughlins Ltd., Pittsburgh, Pa.
 Keasey Pulley Co., Toledo, O.
 Ohio Pulley Co., Marion, O.
 Saginaw Mfg. Co., Saginaw, Mich.
 Woods, T. B. Sons, Chambersburg, Pa.

Pump Chains
 Cleveland Galvanizing Works, Cleveland, Ohio.
 Garland & Bain Co., Rankin Station, Pa.

Pumping Machinery
 Cook, A. D., Lawrenceburg, Ind.
 Flier & Stowell Co., Milwaukee, Wis.
 Ingersoll-Sergeant Drill Co., 36 Cortlandt St., N. Y.
 Lake City Engineering Co., Erie, Pa.
 McGowan, J. H. & Co., Cincinnati, O.
 Southwark Fdry. & Mch. Co., Philadelphia, Pa.

Pumps
 Atrol Pump Co., Athol, Mass.
 Barnes Mfg. Co., Mansfield, O.
 Deming Co., Salem, O.
 Flint & Walling Co., Kendallville, Ind.
 Hess, Snyder & Co., Massillon, O.
 Humphreys Mfg. Co., Mansfield, O.
 Myers, F. E. & Bro., Ashland, Ohio.
 Red Jacket Mfg. Co., Davenport, Ia.
 St. Joseph Pump & Mfg. Co., St. Joseph, Mo.
 Wilder, S. & Co., Holliston, Mass.

Punches
 Morrill, Chas., Broadway and Chambers St., N. Y.

Punches, Conductors'
 Meyers Fred. J. Mfg. Co., Hamilton, O.
 Woodman, H. Mfg. & Supply Co., Boston, Mass.

Punches and Shears, Hand and Power
 Berthach & Co., Cambridge City, Ind.
 Bethlehem Foundry & Machine Co., So. Bethlehem, Pa.
 Bicknell Hdw. Co., Jacksonville, Fla.
 Bliss, E. W. Co., Brooklyn, N. Y.
 Heartley Machine Variety Iron & Tool Works, Toledo, Ohio.
 Hilles & Jones Co., Wilmington, Del.
 Merseick C. S. & Co., New Haven, Conn.
 New Doty Mfg. Co., Janesville, Wis.
 Roversford Fdry. & Mch. Co., Roversford, Pa.

Punching and Shearing
 Williams, White & Co., Moline, Ill.
 Harrington & King Perforating Co., Chicago, Ill.

Push Carts
 Syracuse Chilled Plow Co., Syracuse.

Pyrometers
 Uebbing, Steinbart & Co., Ltd., Carlstadt, N. J.

Quotation Records
 Globe-Wernicke Co., Cincinnati, Ohio.

Railroads
 C. C. & St. L. R. R., Cincinnati, O.

Railways, Industrial
 Hunt, C. W. Co., West New Brighton, N. Y.

Rat and Mouse Traps
 Abnerton Trap Co., Abnerton, Ill.
 Burditt & Williams, Boston, Mass.

Ratchet Drills
 Keystone Mfg. Co., Buffalo, N. Y.

Razors
 Buck Bros., Millbury, Mass.
 Fox Cutlery Co., Dubuque, Iowa.
 Kampfe Bros., 8-12 Reade St., N. Y.
 Southington Cutlery Co., Southington, Conn.

Razor Hones
 Pike Mfg. Co., Pike Station, N. H.

Reading Stands
 Allen, D. H. & Co., Miamisburg, O.

Reamers
 Morse Twist Drill & Mch. Co., New Bedford, Mass.

Recording Gauges
 Bristol Co., Waterbury, Conn.
 Uehling, Steinbart & Co., Ltd., Carlstadt, N. J.

Reels
Hendryx, A. B. Co., New Haven, Conn.

Refrigerating Machinery
York Mfg. Co., York, Pa.

Refrigerators
Baldwin Refrigerator Co., Burlington, Vt.
Eclipse Refrigerator Wks., Burlington, Vt.
Maine Mfg. Co., Nashua, N. H.

Registers
Seavey Mfg. Co., Boston, Mass.
Stowell Mfg. & Foundry Co., So. Milwaukee, Wis.

Relaying Rails
Block & Lull Iron Co., Chicago, Ill.
Donaldson & Newton, Phila., Pa.
Isaac Joseph Iron Co., Cincinnati, O.
May & Spalding, Atlanta, Ga.
Steel & All Supply Co., 100 B'way, N. Y.

Reloading Tools
Bridgeport Gun Implement Co., 318-323 Broadway, N. Y.
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
Ideal Mfg. Co., New Haven, Conn.

Repairing Sets, Family
Mitchell, W. B. Chicago, Ill.

Repair Outfits, Farmers'
Star Heel Plate Co., Newark, N. J.

Revolutions Counters
Imperial Bit & Snap Co., Racine, Wis.

Revolvers
Pitkin, A. B. Machinery Co., Providence, R. I.
Taber Mfg. Co., Elizabeth, N. J.

Rheostats
Harrington & Richardson Arms Co., Worcester, Mass.
Johnson, Iver, Arms & Cycle Works, Fitchburg, Mass.

Rhodes
Electric Controller & Supply Co., Cleveland, O.

Rifles
Marlin Fire Arms Co., New Haven, Ct.
Remington Arms Co., 315 B'way, N. Y.
Stevens Arms & Tool Co., Chicopee Falls, Mass.

Ring Rollers
Shuster, F. B. Co., New Haven, Conn.

Riveters
Phila. Pneumatic Tool Co., Phila., Pa.

Rivets
American Iron & Steel Mfg. Co., Lebanon, Pa.
American Screw Co., Providence, R. I.
Blake & Johnson, Waterbury, Conn.
Burden Iron Co., Troy, N. Y.
Clark & Cowles, Plainville, Conn.
Cobb & Drew, Plymouth, Mass.
Garland Chain Co., Rankin station, Pa.
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
Lanz, M. & Sons, Pittsburgh, Pa.
McIntire, C. E. & Co., Phila., Pa.
Plymouth Mills, Plymouth, Mass.
Rockford Bolt Works, Rockford, Ill.
Townsend C. C. & E. F., New Brighton, Pa.

Riveting Machines
Bethlehem Foundry & Mch. Co., So. Bethlehem, Pa.
Shuster, F. B. Co., New Haven, Conn.

Rod Mill Machinery
Bradlock Machine & Mfg. Co., Bradock, Pa.
Morgan Construction Co., Worcester, Mass.

Roll Turning Tools
Tretlow, Sam'l & Co., Ltd., Pittsburgh

Roller Bearings
Ball Bearing Co., Boston, Mass.
Mossberg & Granville Mfg. Co., Providence, R. I.

Rolling Mill Machinery
Booth, The Lloyd Co., Youngstown, O.
Everson, B. M., Pittsburgh, Pa.
Farrell Fdry. & Mch. Co., Ansonia, Ct.
Frank-Kneeland Mach. Co., Pittsburgh
Garrison, A. Foundry Co., Pittsburgh
Mesta Machine Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Mossberg & Granville Mfg. Co., Providence, R. I.
Penna. Engineering Wks., New Castle, Penna.
Totten & Hogg Iron & Steel Fdry. Co., Pittsburgh, Pa.

Rolls, Chilled, Sand and Steel
Brown & Hogg Iron Fdry., Derby, Conn.
Booth, The Lloyd Co., Youngstown, O.
Farrell Fdry. & Mch. Co., Ansonia, Ct.
Frank-Kneeland Mach. Co., Pittsburgh
Garrison, A. Foundry Co., Pittsburgh
Mesta Machine Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Mossberg & Granville Mfg. Co., Providence, R. I.
Penna. Engineering Wks., New Castle, Penna.
Totten & Hogg Iron & Steel Fdry. Co., Pittsburgh, Pa.

Roofing and Siding
Anshutz Ready Roofing Co., 136 Water St., N. Y.
Garry Iron & Steel Roofing Co., Cleveland, O.
Scaife, Wm. B. & Sons, Pittsburgh
Youngstown Iron & Steel Roofing Co., Youngstown, O.

Rope and Cordage
American Mfg. Co., 65 Wall St., N. Y.
Waterbury Rope Co., 69 South St., N. Y.

Rope and Web Goods
Covert Mfg. Co., West Troy, N. Y.

Rope Shield
Ironshield Co., Columbus, Ohio

Rope Transmission and Hoisting
American Mfg. Co., 65 Wall St., N. Y.
California Wire Works, San Francisco
Hunt, C. W. Co., West New Brighton, N. Y.
Leschen, A. & Sons, Rope Co., St. Louis
Wood & T. B. Sons Chambersburg, Pa.

Rubber Goods
Boston Belting Co., Boston, Mass.
Canfield, H. O. Bridgeport, Conn.
Peerless Rubber Mfg. Co., 16 Warren Street, N. Y.

Rubber Scrap
Hofeller, Theo. & Co., Buffalo, N. Y.

Rules
Lufkin Rule Co., Saginaw, Mich.
Stanley Rule & Level Co., 29 Chambers St., N. Y.

Safety Razors
Kampfe Bros., 8-12 Reade St., N. Y.

Sand Irons
Enterprise Mfg. Co., Phila., Pa.
Williams, A. C., Ravenna, O.

Sand Blast Apparatus
Ward, Edgar T. & Sons, Boston, Mass.

Sand Paper
Baeder, Adamson & Co., Phila., Pa.

Sash Balances
Caldwell Mfg. Co., Rochester, N. Y.
Fulman Sash Balance Co., Rochester, N. Y.
Streeter, N. K. & Co., Rochester, N. Y.

Sash Cords and Chains
Bridgeport Chain Co., Bridgeport, Conn.
Morton, Thos., 65 Elizabeth, N. Y.
Samson Cordage Works, Boston, Mass.
Silver Lake Co., Boston, Mass.
Smith & Egge Mfg. Co., Bridgeport, Conn.

Sash Locks
Ellis, F. S. & Son, Milldale, Conn.
Fitch, W. & E. T. Co., The New Haven, Conn.

Sash Pulleys
Fox Machine Co., Grand Rapids, Mich.
Grand Rapids Hardware Co., Grand Rapids, Mich.
Palmer Hardware Mfg. Co., Troy, N. Y.

Sash Weights
Barney & Reed Mfg. Co., Boston, Mass.
Brown, E. E. & Co., Philadelphia, Pa.
Enterprise Foundry Co., Cincinnati, O.

Sausage Stuffers
National Specialty Mfg. Co., Phila., Pa.

Saws
Atkins, E. C. & Co., Indianapolis, Ind.
Bishop, Geo. H. & Co., Cincinnati, Ohio.
Dieton, Henry & Sons, Inc., Phila., Pa.
National Saw Co., Newark, N. J.
Simonds Mfg. Co., Fitchburg, Mass.

Saw Clamps
Dieton, Henry & Sons, Inc., Phila., Pa.

Saw Guides
Thompson Scale & Co., Lowell, Mass.

Saw Handles
Ladd, W. C., Bristol, Conn.

Saw Sets
Dieton, Henry & Sons, Inc., Phila., Pa.
Morrill, Chas., Broadway and Chambers St., N. Y.
Trotter, Geo. Co., 9 to 15 Murray, N. Y.

Saw Tools
Atkins, E. C. & Co., Indianapolis, Ind.

Scales
Chattillon, John & Sons, 85-89 Cliff, N. Y.
Chicago Seal Co., Chicago, Ill.
Pelouze Scale & Mfg. Co., Chicago, Ill.
Standard Scale & Supply Co., Pittsburgh.

Scrap Metals
Armstrong, R. S. & Bro., Atlanta, Ga.
Blake, M. J. & M., 10th Ave. and 15th St., N. Y.
Rotger, C., Hoboken, N. J.
Greiner, F., Philadelphia, Pa.
Hartner, H. A. & Sons, Phila., Pa.
Hofeller, Theo. & Co., Buffalo, N. Y.
Kennedy, L. E. & Co., 95 Liberty St., N. Y.
Leaf, E. B. & Co., Philadelphia, Pa.
Leonard, John & Co., 22 Broadway, N. Y.
Miles, E. C. & Co., Atlanta, Ga.
N. J. Iron & Metal Co., Paterson, N. J.
Phillips, F. R. & Sons Co., Phila., Pa.
Rogers, W. H., Bridgeport, Conn.
Samuels, M. Sons, Brooklyn, N. Y.
Smith, Morton B. Co., New York.

Scrapers, Road
American Steel Scraper Co., Sidney, O.
Aultman Co., Canton, Ohio.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Sidney Steel Scraper Co., Sidney, O.
Syracuse Chilled Iron Co., Syracuse, N. Y.

Screens, Perforated Metal
Harrington & King Perforating Co., Chicago, Ill.

Screens, Window and Door
Daroy, Edw. & Sons, Philadelphia, Pa.

Screw Cutting Attachment
National Machine Tool Co., Cincinnati, O.

Screw Cutting Dies
Card, S. W. Mfg. Co., Mansfield, Mass.
Geometric Drill Co., Westfield, Mass.
Rogers, Jno. M. Boat Gauge & Drill Wks., Gloucester City, N. J.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.
Winter Bros., Wrentham, Mass.

Screw Drivers
Braunsdorf-Mueller Co., Elizabeth, N. J.
Brown, R. H. & Co., New Haven, Conn.
Gay, Geo. E., Augusta, Me.
Gibell-Pratt Co., Greenfield, Mass.
Mayhew, H. H. Co., Shelburne Falls, Mass.
New England Specialty Co., No. Easton, Mass.

Screw Machine Products
North Bros. Mfg. Co., Philadelphia, Pa.
Sawyer Tool Co., Fitchburg, Mass.
Tower & Lyon, 95 Chambers St., N. Y.
Union Mfg. Co., Buffalo, N. Y.

Screw Machinery
Dodge Machine Screw Co., Boston, Mass.

Screw Machines
American Tool Wks. Co., Cincinnati, O.
Baker Bros., Toledo, O.
Brown & Sharpe Mfg. Co., Providence, R. I.
Draper Mach. Tool Co., Worcester, Mass.
Garvin Machine Co., Springfield and Varick Sts., N. Y.
Jones & Lamson Mch. Co., Springfield, Vt.
Windsor Mch. Co., Windsor, Vt.

Screws
Hall's Sam'l Sons, 229 West 10th St., N. Y.
Haskell, Wm. H. Mfg. Co., Pawtucket, R. I.

Machine
American Screw Co., Providence, R. I.
Blake & Johnson, Waterbury, Conn.
Chicago Screw Co., Chicago, Ill.
Haskell, Wm. H. Mfg. Co., Pawtucket, R. I.
Hubbell, Harvey, Bridgeport, Conn.
Illinois Screw Co., Chicago, Ill.
Miles, F. S., 355 Quarry, Philadelphia, Pa.
Niagara Screw Co., Buffalo, N. Y.
Phila. Mach. Screw Works, Phila., Pa.
Pittsburgh Screw & Bolt Co., Pittsburgh, Pa.
Reed & Curtis Mch. Screw Co., Worcester, Mass.
Rhode Island Tool Co., Providence, R. I.
Southington Cutlery Co., Southington, Conn.
Worcester Mch. Screw Co., Worcester, Mass.

Wood
American Screw Co., Providence, R. I.
Franklin Moore Co., Winsted, Conn.
Reading Hardware Co., Reading, Pa.
Reading Screw Co., Norristown, Pa.
Southington Cutlery Co., Southington, Conn.

Scroll Saws
Barnes, W. F. & John Co., Rockford, Ill.
Millers Falls Co., 28 Warren St., N. Y.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.

Seythe Stones and Whetstones
Chicago Wheel & Mfg. Co., Chicago.
Cleveland Stone Co., Cleveland, O.
Pike Mfg. Co., Pike Station, N. H.

Seamless Steel Tubes
Lancaster, 87 Broadway, N. Y.
Janney, Steinmetz & Co., Phila., Pa.
National Tube Co., Pittsburgh, Pa.

Security Snaps
Sundries Mfg. Co., South Bend, Ind.

Set Screw Protectors
Canfield, H. O., Bridgeport, Conn.

Sewing Machines
Demorest Mfg. Co., Williamsport, Pa.
National Sewing Machine Co., Belvidere, Ill.

Shaft Coupling
Fairbanks Co., 311 Broadway, N. Y.
Nicholson, W. H. & Co., Wilkes-Barre, Pa.

Shafting
Cresson, Geo. V. Co., Philadelphia, Pa.
Dodge Mfg. Co., Mishawaka, Ind.
Fairmont Mch. Co., Philadelphia, Pa.
Finished Steel Co., Youngstown, O.
Jones & Laughlins Co., Pittsburgh, Pa.
Pardee, J. W., Perth Amboy, N. J.
Pittsburgh Steel Shafting Co., Rankin, Pa.
Stow Mfg. Co., Binghamton, N. Y.
Woods, T. B. Sons, Chambersburg, Pa.

Shaped Iron and Steel
Allentown Rolling Mill, Allentown, Pa.
American Steel Hoop Co., Battery Park Building, N. Y.
American Steel & Wire Co., Chicago, Ill.
Forest City Steel & Iron Co., Cleveland, Ind.
Lindsay, W. W. & Co., Phila., Pa.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
National Steel Co., Bridgeport, O.
Passaic Rolling Mill Co., Paterson, N. J.
Phoenix Iron Co., Phila., Pa.
Pittsburgh Steel Shafting Co., Rankin, Pa.
Republic Iron & Steel Co., Chicago, Ill.

Shapers
Barker-Chard Mach. Tool Co., Cincinnati, O.
Cincinnati Shaper Co., Cincinnati, O.
Gould & Eberhardt, Newark, N. J.
Potter & Johnston Co., Pawtucket, R. I.

Shear Knives
Pittsburgh Shear, Knife & Machine Co., Pittsburgh, Pa.
Tretlow, Sam'l & Co., Ltd., Pittsburgh

Shears and Scissors
Acme Shear Co., Bridgeport, Conn.
Bridgeport Mfg. Co., Bridgeport, Conn.
Cattaraugus Cutlery Co., Little Valley, N. Y.
Heinrich's, R. Sons Co., Newark, N. J.
Jackson Knife & Shear Co., Fremont, O.
Lane Cutlery Works, Cedar Rapids, Ia.
National Cutlery Co., Phila., Pa.
Wiebusch & Hilger, Ltd., 9-15 Murray St., N. Y.

Shears, Metal
Carlin's, Thomas Sons Co., Allegheny, Pa.

Sheet Bars
National Steel Co., Battery Park Building, N. Y.

Sheet and Bolt Copper
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.

Sheet and Rolled Brass
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.

Sheet Metal Machinery
Adrian Mach. Works, Brooklyn, N. Y.

Sheets, Galvanized
American Sheet Steel Co., New York.
McCullough Iron Co., Wilmington, Del.

Sheets, Iron and Steel
American Sheet Steel Co., New York.
McCullough Iron Co., Wilmington, Del.
National Steel Co., Bridgeport, O.
Singer, Nimick & Co., Inc., Pittsburgh, Pa.
Walter, L. & R. Co., Philadelphia, Pa.
Alan Wood Co., Philadelphia, Pa.

Sheet Zinc
Illinois Zinc Co., Peru, Ill.
Mathliessen & Hegeler Zinc Co., La Salle, Ill.

Shelf Boxes
Baker Box Co., Montclair, N. J.
Moore, C. P., Ravenswood, W. Va.

Shelf Ladders
Bicycle Step Ladder Co., Chicago, Ill.
Coburn Trolley Track Mfg. Co., Holyoke, Mass.
Milbradt, G. A. & Co., St. Louis, Mo.
Morley Bros., Saginaw, Mich.

Shelving
Warren, J. D. Mfg. Co., Chicago, Ill.

Shipbuilders
Newport News Shipbuilding & Dry Dock Co., 1 Broadway, N. Y.

Shovels, Spades and Scoops
St. Louis Shovel Co., St. Louis, Mo.
Terre Haute Shovel & Tool Co., Terre Haute, Ind.

Silver Plated Flat and Hollow Ware
Benedict, M. S. Mfg. Co., E. Syracuse, N. Y.

Sinks
Kilbourne & Jacobs Mfg. Co., Columbus, O.

Skates, Ice
Avery Stamping Co., Cleveland, O.
Dane, Stoddard & Co., Boston, Mass.
Union Hardware Co., Torrington, Conn.

Skate Sharpeners
Osborn Mfg. Co., Cleveland, O.

Skylights
Drouve, G. Co., Bridgeport, Conn.

Slaw Cutters
Treadwell & Dorsey Mfg. Co., Indianapolis, Ind.

Smelting Works
Reeves, Paul S., 760 S. Broad, Phila.

Soapstone Goods
Pike Mfg. Co., Pike Station, N. H.

Soapstone Pencils
Steward, D. M. Mfg. Co., Chattanooga, Tenn.

Socket Wrenches
Harris, Sam'l & Co., Chicago, Ill.

Soldering Copper Handles
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.

Soldering Coppers
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.

Spark Guards
Lowes, S. M. Co., Boston, Mass.

Sparking Tubes
Ostrander, W. R. & Co., 204 Fulton St., N. Y.

Specialty Manufacturers
Franklin, H. H. Mfg. Co., Syracuse, N. Y.
Smith & Egge Mfg. Co., Bridgeport, Ct.

Spelter
Illinois Zinc Co., Peru, Ill.
Mathliessen & Hegeler Zinc Co., La Salle, Ill.

Spelter Solder
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.

Spikes
American Iron & Steel Mfg. Co., Lebanon, Pa.

Spoons and Forks
International Silver Co., Meriden, Ct.

Sporting Goods
Dane, Stoddard & Co., Boston, Mass.

Spray Pumps—(See Pumps)

Springes
American Steel & Wire Co., Chicago, Ill.
Barnes, Wallace Co., Bristol, Conn.
Cary Spring Works, 240 W. 29th St., N. Y.
Chattillon, John & Sons, 85-89 Cliff St., New York.
Clark & Cowles, Plainville, Conn.
Dunbar Bros., Bristol, Conn.
Miller & Van Winkle, Brooklyn, N. Y.
Morgan Spring Co., Worcester, Mass.
Sabin Machine Co., Montpelier, Vt.
Scott, Chas. Spring Co., Phila., Pa.
Welch, T. F. Mfg. Co., Boston, Mass.

Spring Wagons, Etc.
Wurstler, F. W. & Co., Brooklyn, N. Y.

Spring Cutters
Brooks, M. S. & Sons, Chester, Conn.
Holinger Fence Co., Greenville, O.

Spring Hinges
Bommer Bros., Brooklyn, N. Y.
Chicago Spring Butt Co., Chicago, Ill.
Stover Mfg. Co., Freeport, Ill.
Van Wagener & Williams Hdw. Co., Cleveland, O.

Sprocket Chain
Buhl Malleable Co., Detroit, Mich.

Spur Couters, Foot and Power
Shuster, F. B. Co., New Haven, Conn.

Stacks
Scaife, Wm. B. & Sons, Pittsburgh.

Stamped Ware
Jenkinson, R. C. & Co., Newark, N. J.
Keen & Hagerty, Mfg. Co., Baltimore, Md.
New York Stamping Co., Brooklyn, N. Y.

Stamping, Sheet Metal
American Hdw. Mfg. Co., Ottawa, Ill.
American Railway Supply Co., 24 Park Place, N. Y.
American Steel Scraper Co., Sidney, O.
Cleveland Stamping & Tool Co., Cleveland, Ohio.
Davis & Buxton Stamping Co., Worcester, Mass.
Goodwin & Kintz Co., Winsted, Conn.
Houghton & Buxton Mfg. Co., Worcester, Mass.
Jenkinson, R. C. & Co., Newark, N. J.
Konsklow, E. & Bro., Cleveland, Ohio.
McKenna Bros. Brass Co., Ltd., Pittsburgh, Pa.
Mossberg, Frank Co., Attleboro, Mass.
Reed & Curtis Mch. Screw Co., Worcester, Mass.

Wheeling Hinge Co., Wheeling, W. Va.
Wilson & Smith, Worcester, Mass.

Staple Machines, Automatic
Shuster, F. B. Co., New Haven, Conn.

Staples and Double Pointed Tacks
Grand Crossing Tack Co., Grand Crossing, Ill.
Milwaukee Tack Co., Milwaukee, Wis.
Titchener, E. H. & Co., Binghamton, N. Y.

Steam Cookers
Peerless Cooker Co., Buffalo, N. Y.

Steam Hammers
Jenckel & Eisenhardt, Philadelphia.
Budgeon, Richard, 24 Columbia St., N. Y.
Pittsburgh Shear Knife & Mach. Co., Pittsburgh, Pa.
Sellers, Wm. & Co., Inc., Phila., Pa.

Steam Heating
Webster, Warren & Co., Camden, N. J.

Steam Saws
Harrison Safety Roller Wks., Phila., Pa.
Webster, Warren & Co., Camden.

Steam Shovels
The Automatic Shovel Co., Lorain, O.

Steam Specialties
Steam Shovel & Valve Co., Boston.
Lunkenheimer Iron Co., Cincinnati, O.
Mason Regulator Co., Boston, Mass.

Steel Buildings
American Bridge Co., East Berlin, Ct.
Boston Bridge Works, Boston, Mass.
New England Structural Co., Boston, Mass.

Steel Chimneys
Lindsay, W. W. & Co., Phila., Pa.

Steel, Cold Rolled Strip
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
Wolf, R. H. & Co., Ltd., 118th Street and Harlem River, N. Y.

Steel Forgings and Castings
Bethlehem Steel Co., So. Bethlehem, Pa.

Steel Hoops
American Steel Hoop Co., Battery Park Building, N. Y.

Steel Importers
Hobson, Houghton & Co., 98 John St., N. Y.
Jessop, Wm. & Sons, Sheffield, England, or 91 John St., N. Y.
Milne, A. & Co., 1 Broadway, N. Y.
Wheelock, Lovejoy & Co., New York and Boston.

Steel (Mushet's) Special
Jones, B. M. & Co., Boston.

Steel Manufacturers
American Steel Hoop Co., Battery Park Building, N. Y.
American Steel & Wire Co., Chicago, Ill.
Baker, Hermann & Co., 103 Duane St., New York.
Braeburn Steel Co., Braeburn, Pa.
Canton Steel Co., Canton, Ohio.
Champion Iron & Steel Co., Muskegon, Mich.
Chester Steel Castings Co., Phila., Pa.
Chrome Steel Works, Brooklyn, N. Y.
Crescent Steel Co., Pittsburgh, Pa.
Frankford Steel Co., Philadelphia.
Hobson, Houghton & Co., 98 John St., N. Y.
Jessop, Wm. & Sons, Sheffield, England, or 91 John St., New York.
Jones & Laughlins, Ltd., Pittsburgh, Pa.
Kidd Bros. & Rurgner Steel Wire Co., McKees Rocks, Pa.
La Belle Steel Co., Pittsburgh, Pa.
Lorain Steel Co., Lorain, Ohio.

- Lukens Iron & Steel Co.**, Coatesville, Pa.
Nash, Geo. & Co., Chicago.
- National Steel Co.**, Battery Park Building, N. Y.
- Newark, J. B. & Co.**, Philadelphia, Pa.
- Otis Steel Co., Ltd.**, Cleveland, Ohio.
- Republic Iron & Steel Co.**, Chicago, Ill.
- Rowland, Wm. & Harvey**, Frankford, Philadelphia.
- Singer, Nimick & Co., Inc.**, Pittsburgh, Pa.
- Wardlaw, S. & C.**, Sheffield, England.
- Wilmot & Hobbs Mfg. Co.**, Bridgeport, Conn.
- Manufacturers' Agents**
Ogden & Wallace, 571-583 Greenwich St., New York.
- Snyder, W. F. & Co.**, Pittsburgh, Pa.
- Tennessee Coal, Iron & R. R. Co.**, Birmingham, Ala.
- Virginia Iron, Coal and Coke Co.**, Bristol, Va.—Tenn.
- Steel, Self Hardening**
Denman & Davis, 85-87 John St., N. Y.
- Steel Rails**
Lorain Steel Co., Lorain, Ohio.
- Steel Stamps and Stencil Dies**
Kucker, L. A. Stamp Wks., Little Ferry, N. J.
- Ness, Geo. M., Jr.**, 61 Fulton St., N. Y.
- Schwerdtle & Siebert**, Bridgeport, Conn.
- Steel, Tool**
Braeburn Steel Co., Braeburn, Pa.
- Canton Steel Co.**, Canton, Ohio.
- Crescent Steel Co.**, Pittsburgh, Pa.
- Denman & Davis**, 85-87 John St., N. Y.
- Frankford Steel Co.**, Philadelphia, Pa.
- Jessop, Wm. & Sons**, Sheffield, England, 91 John St., N. Y.
- Jones, B. M. & Co.**, Boston, Mass.
- La Belle Steel Co.**, Pittsburgh, Pa.
- Nash, Geo. & Co.**, Chicago.
- Singer, Nimick & Co.**, Pittsburgh, Pa.
- Step Ladders**
Handy Ladder Works, Cleveland, O.
- Step Ladders, Rolling**
Bicycle Step Ladder Co., Chicago, Ill.
- Coburn Trolley Track Mfg. Co.**, Holvake, Mass.
- Milbradt, G. A. & Co.**, St. Louis, Mo.
- Morley Bros.**, Saginaw, Mich.
- Stamps and Dies**
Armstrong Mfg. Co., Bridgeport, Conn.
- Card, S. W. Mfg. Co.**, Mansfield, Mass.
- Curtis & Curtis**, Bridgeport, Conn.
- Fairbanks Co.**, 311 Broadway, N. Y.
- Hollands Mfg. Co.**, Erie, Pa.
- Jones & Lamson Mch. Co.**, Springfield, Vt.
- Jarecki Mfg. Co.**, Erie, Pa.
- Oster Mfg. Co.**, Cleveland, Ohio.
- Saunders' Sons**, D., Yonkers, N. Y.
- Wells Bros. & Co.**, Greenfield, Mass.
- Wiley & Russell Mfg. Co.**, Greenfield, Mass.
- Winter Bros.**, Wrentham, Mass.
- Stone Cutting Machinery**
Gilmour, J., Bennett Bldg., N. Y.
- Stone Working Machinery**
Patch, F. K. Mfg. Co., Rutland, Vt.
- Steel Screws**
Read, A. F. & Co., Chicago, Ill.
- Store Fixtures**
Warren, J. M. Mfg. Co., Chicago, Ill.
- Stern Window Fasteners**
Woodruff, W. & Sons, Mt. Carmel, Ct.
- Stove Hardware**
Troy Nickel Works, Troy, N. Y.
- Stove Linings**
Ostrander Fire Brick Co., Troy, N. Y.
- Stove Pipe Thimbles**
Cheney, S. & Son, Manlius, N. Y.
- Stove Trucks**
Arcade Mfg. Co., Freeport, Ill.
- Hovos, S. M. Co.**, Boston, Mass.
- Stoves, Oil, Vapor and Gasoline**
Dankler Stove & Mfg. Co., Cleveland, O.
- Novalty Mfg. Co.**, Jackson, Mich.
- Schneider & Trenkamp Co.**, Cleveland, Ohio.
- Straightening Machines, Wire and Sheet Metal**
Shuster, F. B. Co., New Haven, Conn.
- Structural Iron and Steel Work**
American Bridge Co., East Berlin, Ct.
- Boston Bridge Works**, Boston, Mass.
- Du Bois Iron Works**, Du Bois, Pa.
- Eastern Bridge & Structural Co.**, Worcester, Mass.
- Forest City Steel & Iron Co.**, Cleveland, Ohio.
- Illinois Steel Co.**, Chicago, Ill.
- Moseley Iron Bridge & Roof Co.**, 39 Cortlandt St., N. Y.
- New England Structural Co.**, Boston, Mass.
- Phoenix Iron Co.**, Philadelphia, Pa.
- Ritter-Conley Mfg. Co.**, 171 E. 10th St., Pa.
- Stewart Iron Works**, Cincinnati, Ohio.
- West Side Foundry Co.**, Troy, N. Y.
- Sulphuric Acid**
Matthiessen & Heiler Zinc Co., La Salle, Ill.
- Swaging Machine**
Excelator Needle Co., Torrington, Ct.
- Table Ware**
International Silver Co., Meriden, Ct.
- Tacks, Brads, &c.**
Diamond Tack & Nail Works, Raynham, Mass.
- Grand Crossing Tack Co.**, Grand Crossing, Ill.
- Milwaukee Tack Co.**, Milwaukee, Wis.
- Plymouth Mills**, Plymouth, Mass.
- Ripley & Bartlett**, Plymouth, Mass.
- Shelton Co.**, Birmingham, Conn.
- Tack and Nail Machinery**
Kimball Bros. & Sprague, Brockton, Mass.
- Sweetzer, W. A.**, Brockton, Mass.
- Tanks, Iron and Steel**
Clarendon Soller Wks., No. Clarendon, Pa.
- Scaife, Wm. R. & Sons**, Pittsburgh, Pa.
- Taps**
Larkin Rule Co., Saginaw, Mich.
- Tap Holder**
Ideal Machine Works, Hartford, Conn.
- Tapping Machines**
Hubbell, Harvey, Bridgeport, Conn.
- Taps and Dies**
Beiley, C. H. & Co., Chicago, Ill.
- Butterfield & Co.**, Derby Line, Vt.
- Card, S. W. Mfg. Co.**, Mansfield, Mass.
- Reece, E. F. Co.**, Greenfield, Mass.
- Wells Bros. & Co.**, Greenfield, Mass.
- Wiley & Russell Mfg. Co.**, Greenfield, Mass.
- Winter Bros.**, Wrentham, Mass.
- Telephones**
Rawson Electric Co., Florida, Ohio.
- Terre Plate**
American Tin Plate Co., N. Y.
- Thimble Skeins**
Mitchell, W. B., Chicago, Ill.
- Time Recorders**
Chicago Time Register Co., Chicago, Ill.
- Cleveland Register Co.**, Oberlin, O.
- Nantz, C. & Co.**, 127 Duane St., N. Y.
- Simplex Time Recorder Co.**, Gardner, Mass.
- Wagoner Watchman Clock Co.**, Grand Rapids, Mich.
- Tin Mills**
Philadelphia Roll & Mch. Co., Phila., Pa.
- Phillips, F. R. & Sons Co.**, Phila., Pa.
- Tinners' Tools and Machines**
Magara Machine & Tool Works, Buffalo, N. Y.
- Tin Plate**
American Tin Plate Co., N. Y.
- Champion Iron & Steel Co.**, Muskegon, Mich.
- Merchant & Co., Inc.**, Philadelphia, Pa.
- Tin Plate Machinery**
Lloyd Booth Co., Youngstown, Ohio.
- Tinware**
Keen & Hagerty, Baltimore, Md.
- Tinware Machinery**
Shuster, F. B. Co., New Haven, Conn.
- Tobin Bronze**
Ansonia Brass & Copper Co., 99 John St., N. Y.
- Toe Calks**
Leonhardt & Co., Berlin, Schöneberg, Germany.
- Toe Calks, Steel**
Burke, F. F., Boston, Mass.
- Toilet Goods, Gold and Silver Plated**
Benedict, M. S. Mfg. Co., E. Syracuse, N. Y.
- Tool Chests**
Am. Tool Chest Co., 200 W. Houston St., New York.
- Bliss, R. Mfg. Co.**, Fawtucket, R. I.
- Tool Grinders**
Sellers, Wm. & Co., Inc., Phila., Pa.
- Union Mfg. Co.**, Buffalo, N. Y.
- Tool Holders**
Armstrong Bros. Tool Co., Chicago, Ill.
- Hill Tool Co.**, Anderson, Ind.
- Hogston & Pettis Mfg. Co.**, New Haven, Conn.
- Tools**
Athol Machine Co., Athol, Mass.
- Brown, R. H. & Co.**, New Haven, Conn.
- Fray, Jno. S. & Co.**, Bridgeport, Conn.
- Goodell Pratt Co.**, Greenfield, Mass.
- Mayhew, H. H. Co.**, Shelburne Falls, Mass.
- Meyers Falls Co.**, 28 Warren St., N. Y.
- Myers, S. F. Co.**, 48-50 Maiden Lane, N. Y.
- Springfield Machine Screw Co.**, Springfield, Mass.
- Stanley Rule & Level Co.**, 29 Chambers St., New York.
- Starrett, L. S. Co.**, Athol, Mass.
- Stevens, J., Arms & Tool Co.**, Chippewa, Wis.
- Tower & Lyon**, 36 Chambers St., N. Y.
- Tools, Blacksmith and Wheelwright**
Champion Blower & Forge Co., Lancaster, Pa.
- Wiley & Russell Mfg. Co.**, Greenfield, Mass.
- Tools, Steam and Gas Fitters'**
Saunders' Sons, D., Yonkers, N. Y.
- Torches, Oil and Gasoline**
Schneider & Trenkamp Co., Cleveland, O.
- Tote Boxes**
Clark, W. J. & Co., Salem, O.
- Transom Openers**
Ormsby, E. A., Melrose, Mass.
- Tree Guard**
Hartman Mfg. Co., 309 Broadway, N. Y.
- Up-to-date Mfg. Co.**, Terre Haute, Ind.
- Trimmers**
American Mach'y Co., Grand Rapids, Mich.
- Trolleys**
Box, Alfred & Co., Philadelphia, Pa.
- Trowels**
Bishop, Geo. H. & Co., Cincinnati, O.
- National Saw Co.**, Newark, N. J.
- Trucks**
Boston & Lockport Block Co., Lockport, Pa.
- Fairbanks Co.**, 311 Broadway, N. Y.
- Kilbourne & Jacobs Mfg. Co.**, Columbus, N. Y.
- Syracuse Chilled Plow Co.**, Syracuse, N. Y.
- Variety Machine Co.**, Warsaw, N. Y.
- Tub Hoops**
Oatman Bros., Medina, Ohio.
- Tube Expanders**
Henderson, A. L. Sons, Wilmington, Del.
- Tubes, Seamless Drawn Copper, Brass and Bronze**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Randolph Clowes Co.**, Waterbury, Conn.
- Tubing, Brass**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Ivins, Ellwood**, 487 Broadway, N. Y.
- Phoenix Tube Co.**, Brooklyn, N. Y.
- Spofford, W. S. & Son**, Providence, R. I.
- Tubing, Flexible Metallic**
Sharp, Klump & Sisson Co., Chicago, Ill.
- Tubing, Iron**
Phoenix Tube Co., Brooklyn, N. Y.
- Tubing, Seamless**
Ivins Ellwood 487 Broadway, N. Y.
- Tubing, Steel**
Hart Transmission Co., Danbury, Ct.
- Ivins, Ellwood**, 487 Broadway, N. Y.
- Janney, Steinmetz & Co.**, Phila., Pa.
- Leah's John S. Son & Co.**, 4 Fletcher St., N. Y.
- National Tube Co.**, Pittsburgh, Pa.
- Wilmot & Hobbs Mfg. Co.**, Bridgeport, Conn.
- Tumbling Barrels**
Henderson Bros., Waterbury, Conn.
- Turnbuckles**
Cleveland City Forge & Iron Co., Cleveland, O.
- Merrill Bros.**, 465 Kent Ave., B'klyn
- Twist Drills**
Cleveland Twist Drill Co., Cleveland, O.
- Morse Twist Drill & Machine Co.**, New Bedford, Mass.
- New Process Twist Drill Co.**, Taunton, Mass.
- Slocumb, J. T. & Co.**, Providence, R. I.
- Standard Tool Co.**, Cleveland, O.
- Twist Drill Grinders**
Heald, L. S. & Son, Barre, Mass.
- Washburn Shops of Worcester Polytechnic Inst.**, Worcester, Mass.
- Wilmarth & Norman**, Grand Rapids, Mich.
- Union Couplings**
Dart, E. M. Mfg. Co., Providence, R. I.
- Unions, Brass**
Nolte Brass Co., Springfield, Ohio.
- Upholsterers' Hardware**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Valves, Gas, Water and Steam**
Ashton Valve Co., Boston, Mass.
- Chapman Valve Mfg. Co.**, Boston.
- Crosby Steam Gage & Valve Co.**, Boston.
- Jenkins Bros.**, 71 John St., N. Y.
- Kennedy Valve Mfg. Co.**, 73 John St., N. Y.
- Linkenheimer Co.**, Cincinnati, Ohio.
- McNab & Harlin Mfg. Co.**, 56 John St., N. Y.
- Metall Regulator Co.**, Boston, Mass.
- Wood, R. D. & Co.**, Philadelphia, Pa.
- Varnish**
Standard Varnish Works, 29 Broadway, N. Y.
- Vegetable Slicers**
Streeter, N. R. & Co., Rochester, N. Y.
- Ventilating Fans**
American Blower Co., Detroit, Mich.
- Bayley, Wm. & Sons Co.**, Milwaukee, Wis.
- Boston Blower Co.**, Hyde Park, Mass.
- Buffalo Forge Co.**, Buffalo, N. Y.
- Exeter Machine Wks.**, Boston, Mass.
- Perkins, B. F. & Son**, Holyoke, Mass.
- Ventilating System**
Ormsby, E. A., Melrose, Mass.
- Ventilator Appliances**
Howard & Morse, 45 Fulton St., N. Y.
- Ventilators**
Drew & Co., Bridgeport, Conn.
- Merchant & Co., Inc.**, Philadelphia, Pa.
- Ventilator Openers**
Ormsby, E. A., Melrose, Mass.
- Vertical Milling Machines**
Ingersoll Milling Machine Co., Rockford, Ill.
- Vises**
Athol Machine Co., Athol, Mass.
- Bignall & Keeler Mfg. Co.**, Edwardsville, Ill.
- Hollands Mfg. Co.**, Erie, Pa.
- Howard Iron Works**, Buffalo, N. Y.
- Lewis Tool Co.**, 44 Barclay St., N. Y.
- Massey Vise Co.**, Chicago, Ill.
- Parker, Chas. Co.**, Meriden, Conn.
- Prentiss Vise Co.**, 44 Barclay St., N. Y.
- Utica Drop Forge & Tool Co.**, Utica, N. Y.
- Wagon Jacks**
Cover's Mfg. Co., West Troy, N. Y.
- Covers' Saddlery Works**, Farmer, N. Y.
- Livestock Co.**, Poughkeepsie, N. Y.
- Morris, P. C.**, Newport, Pa.
- Washers**
Hal & Sam'l Sons 229 West 10th St., N. Y.
- Haskell, Wm. H. Mfg. Co.**, Pawtucket, R. I.
- Nut & Washer Mfg. Co.**, Milwaukee, Wis.
- Wilson & Smith**, Worcester, Mass.
- Washers, Lead**
Milton Mfg. Co., Milton, Pa.
- Washing Machines**
Boss Washing Mch. Co., Cincinnati, O.
- Brammer, H. F. Mfg. Co.**, Davenport, Ia.
- Buckeye Churn Co.**, Sidney, O.
- Clark, Quen & Morse**, Erie, Pa.
- Richmond Cedar Works**, Richmond, Va.
- Wayne, Anthony Mfg. Co.**, Ft. Wayne, Ind.
- Watchman's Clocks**
Nantz, C. & Co., 127 Duane St., N. Y.
- Wagoner Watchman Clock Co.**, Grand Rapids, Mich.
- Water Gates**
Kennedy Valve Mfg. Co., 73 John St., N. Y.
- Water Wheels**
Poole, Robt. & Son Co., Baltimore, Md.
- Welding**
Standard Welding Co., Cleveland, O.
- Well Supplies**
Cook, A. D., Lawrenceburg, Ind.
- Wheelbarrows**
American Steel Scraper Co., Sidney, O.
- Kilbourne & Jacobs Mfg. Co.**, Columbus, N. Y.
- Syracuse Chilled Plow Co.**, Syracuse, N. Y.
- Wheels, Steel**
Havana Metal Wheel Co., Havana, Ill.
- Wind Mills**
Flint & Walling Co., Kendallville, Ind.
- Window Cord**
Samson Cordage Works, Boston, Mass.
- Window Fasteners**
Stanley Works, New Britain, Conn.
- Window Stop Adjusters**
Ives, H. B. & Co., New Haven, Conn.
- Window Weights**
Barney & Reed Mfg. Co., Boston, Mass.
- Wire**
Milton-Grawold Wire Co., Sterling, Ill.
- Felten & Guillaume Carlswerk**, Mulheim am Rhein, Germany.
- Grand Crossing Tack Co.**, Grand Crossing, Ill.
- Kidd Bros. & Rurher Steel Wire Co.**, McKees Rocks, Pa.
- Miller & Van Winkle**, Brooklyn, N. Y.
- National Wire Co.**, New Haven, Ct.
- New Haven Wire Mfg. Co.**, New Haven, Conn.
- Prentiss, Geo. W. & Co.**, Holyoke, Mass.
- Reading Screw Co.**, Norristown, Pa.
- Spencer Wire Co.**, Worcester, Mass.
- Stewart Wire Co.**, Easton, Pa.
- Summit Wire Co.**, Cuyahoga Falls, O.
- Townsend, C. C. & E. P.**, New Brighton, N. Y.
- Wolf, R. H. & Co., Ltd.**, 115th St. and 116th St., N. Y.
- Wright & Colton Wire Cloth Co.**, Worcester, Mass.
- Wire Chains**
Bridgeport Chain Co., Bridgeport, Ct.
- Hungerford, U. T., Brass & Copper Co.**, 121 Worth St., N. Y.
- Unedla Community, Ltd.**, Niagara Falls, N. Y.
- Wire Cloth**
Barnum, E. T., Detroit, Mich.
- Clinton Wire Cloth Co.**, Clinton, Mass.
- Derby, Edward & Sons**, Philadelphia.
- Estey Wire Works Co.**, 65 Fulton St., New York.
- Gilbert & Bennett Mfg. Co.**, 44 Cliff St., New York.
- Howard & Morse**, 45 Fulton St., N. Y.
- Hungerford, U. T., Brass & Copper Co.**, 121 Worth St., New York.
- Ludlow Saylor Wire Co.**, St. Louis, Mo.
- Michigan Wire Cloth Co.**, Detroit, Mich.
- New Freedom Wire Cloth Co.**, New Freedom, Pa.
- N. J. Wire Cloth Co.**, Trenton, N. J.
- Scheeler's Sons**, Buffalo, N. Y.
- Tyler, W. S. Co.**, Cleveland, O.
- Wickwire Bros.**, Cortlandt, N. Y.
- Wright & Colton Wire Cloth Co.**, Worcester, Mass.
- Wire Cutters**
Chandler & Farquhar, Boston, Mass.
- King, J. M. & Co.**, Watertown, N. Y.
- Utica Drop Forge & Tool Co.**, Utica, N. Y.
- Wire Dies**
McFarland, Wm., Trenton, N. J.
- Wire Drawing Machinery**
Morgan Construction Co., Worcester.
- Mosberg & Granville Mfg. Co.**, Providence, R. I.
- Wire Fences—(See Fencing, Iron and Wire.)**
- Wire Goods**
Brooks, M. S. & Sons, Chester, Conn.
- Darby, Edward & Sons**, Philadelphia.
- Gilbert & Bennett Mfg. Co.**, 44 Cliff St., New York.
- Jones, E. Mfg. Co.**, Pawtucket, R. I.
- Meyers, Fred J. Mfg. Co.**, Hamilton, O.
- Michigan Wire Cloth Co.**, Detroit, Mich.
- Scheeler's Sons**, Buffalo, N. Y.
- Wickwire Bros.**, Cortlandt, N. Y.
- Wire Goods Co.**, Worcester, Mass.
- Wire Forming Machinery**
Automatic Machine Co., Bridgeport, Ct.
- Manville, E. J. Mch. Co.**, Waterbury, Ct.
- Nelson, A. H. Mch. Co.**, Bridgeport, Ct.
- Snuster, F. B. Co.**, New Haven, Conn.
- Wire Mill Machinery**
Braddock Mch. & Mfg. Co., Braddock, Pa.
- Turner, Vaughn & Taylor Co.**, Cuyahoga Falls, O.
- Wire Mats**
Hartman Mfg. Co., 309 Broadway, N. Y.
- U. S. Wire Mat Co.**, Decatur, Ills.
- Wire Nails**
American Screw Co., Providence, R. I.
- Dillon-Grawold Wire Co.**, Sterling, Ill.
- Grand Crossing Tack Co.**, Grand Crossing, Ills.
- National Wire Co.**, New Haven, Ct.
- Summit Wire Co.**, Cuyahoga Falls, O.
- Townsend, C. C. & E. P.**, New Brighton, N. Y.
- Wire Nail Machinery**
Braddock Mch. & Mfg. Co., Braddock, Pa.
- Miller, H. J., Bridgewater, Mass.**
- National Machinery Co.**, Tiffin, Ohio.
- Turner, Vaughn & Taylor Co.**, Cuyahoga Falls, O.
- Wire Pans**
Jenkinson, R. C. & Co., Newark, N. J.
- Wire Reels—Adjustable**
Shuster, F. B. Co., New Haven, Conn.
- Wire Rods, Steel**
Consolidated Iron & Steel Co., Bristol, Pa.
- National Wire Co.**, New Haven, Conn.
- Nicoll, J. & Co.**, 56-61 Wall St., N. Y.
- Prentiss, Geo. W. & Co.**, Holyoke, Mass.
- Spencer Wire Co.**, Worcester, Mass.
- Wolf, R. H. & Co., Ltd.**, 115th Street and Harlem River, N. Y.
- Wire Rope, Iron and Steel**
American Steel & Wire Co., Chicago, Ill.
- Broderick & Bascom Rope Co.**, St. Louis.
- California Wire Works**, San Francisco.
- Felten & Guillaume Carlswerk**, Mulheim am Rhein, Germany.
- Hasard Mfg. Co.**, Wilkesbarre, Pa.
- A. Leach & Sons Rope Co.**, St. Louis.
- Macomber & Whyte Rope Co.**, Chicago, Ill.
- Trenton Iron Co.**, Trenton, N. J.
- Waterbury Rope Co.**, 69 South St., N. Y.
- Williamsport Wire Rope Co.**, Williamsport, Pa.
- Wire, Spool**
Malin & Co., Cleveland, O.
- Wire Straightening and Cutting Machinery**
Shuster, F. B. Co., New Haven, Conn.
- Wood Hardware**
Ellis, R. Mfg. Co., Pawtucket, R. I.
- Wood Screw Machinery**
Cook, Asa S. & Co., Hartford, Conn.
- Fox Machine Co.**, Grand Rapids, Mich.
- Wood Trimmers**
American Mach'y Co., Grand Rapids, Mich.
- Wood Working Machinery**
American Mach'y Co., Grand Rapids, Mich.
- Defiance Mch. Works**, Defiance, O.
- Fay, J. A. & Egan Co.**, Cincinnati, O.
- Seneca Falls Mfg. Co.**, Seneca Falls, N. Y.
- Woods, S. A. Machine Co.**, So. Boston, Mass.
- Woodenware**
Richmond Cedar Works, Richmond, Va.
- Wrenches**
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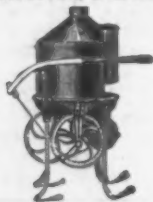
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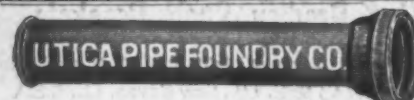
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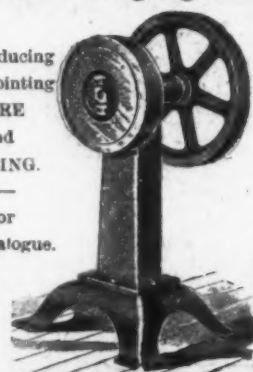
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